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Medical Essays

AND

OBSERVATIONS.

Revised and Published by

A Society in *Edinburgh.*

VOLUME II.

The Second Edition corrected.

EDINBURGH,

Printed by T. and W. RUDDIMANS,

For W. MONRO and W. DRUMMOND. Sold by them and the other Booksellers in *Edinburgh*; by Messr. T. LONGMAN, W. INNYS and R. MANBY, A. BETTESWORTH and C. HITCH, J. DAVIDSON, J. OSWALD, and E. CAVE, *London*; and Messr. BRUCE and SMITH, *Dublin*; A. STALKER, *Glasgow*, and WESTEIN and SMITH at *Amsterdam*.

MDCCXXXVII.


LIBRARY

The PREFACE.

AS we have met with no Objection of great Weight to the Plan laid down in our first Volume, we flatter our selves that it has been generally approved; and therefore have finished our second Volume upon the same Model.

It seems however we have expressed our selves either obscurely or ambiguously in some Particulars; for some Gentlemen have understood us differently from what we would have wished.

It has been thought, that we proposed to confine our Collection to Scotland; *whereas we intended our Preface to the first Volume as a general Invitation to all, of whatever Country, who desired to promote the Knowledge of Medicine, to favour us with their Essays or Observations. Though we still resolve to publish the whole Work in* English, *we hope this will not discourage Foreigners to send us Papers, since we shall endeavour to do Justice, in a Translation, to any that are wrote in* Latin *or* French.

Others have remarked, that we had not mentioned the Effects of chemical Drugs, as a Part of the Subjects to be treated: 'Tis true, this was not fully enough expressed

in

in our Scheme; but we were hopeful our Articles of ſimple Drugs and chemical Experiments might have included the Uſes of their Produce.

We have been told, that our meteorological Regiſter has not a ſufficient Number of Obſervations for each Day, whereby to know the greateſt Degree of Heat or Cold: We acknowledge this Remark to be juſt; but the Circumſtances of the Obſervator are ſuch, as do not conveniently allow of this; and we are afraid ſome Readers think that Regiſter ſufficiently long already.

Several have deſired we would make ſome Application of this Regiſter to the Account of epidemick Diſeaſes: We have put it in every one's Power to make a Compariſon; but, in our Judgment, a much greater Number of yearly Obſervations are required, before any Concluſions concerning the Riſe or Return of epidemick Diſeaſes can be made from the State of the Air.

In the Account of Improvements, Diſcoveries, Books, &c. at the End of this Volume, we have in a great meaſure ſupplied the Deficiencies and Omiſſions of our firſt Volume; at the publiſhing of which it was ſcarce poſſible that all the medical Books publiſhed in the preceding Year could have been brought us.

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Medical

Medical Eſſays

AND

OBSERVATIONS.

ARTICLE I.

The Meteorological Regiſter.

THE Inſtruments with which the Obſervations in the following Regiſter were made, are the ſame, and ſituated in the ſame Manner, as is deſcribed in *Art.* II. of the firſt Volume of this Collection.

JUNE 1732.

D.	Hour.	Baro. In. D.	Ther. In. D.	Hyg. I. D.	Wind. Dir. For.	Weather.	Rain. In. D.
1	8 a. m.	29 6	13 0	1 5	W. 2	Clear --	--- -
	4 p. m.	29 6	14 0	1 3	N. E. 1	clear	
2	8 a. m.	29 8	13 0	1 4	N. W. 2	clear --	0,043
	5 p. m.	29 8	14 4	1 1	N. W. 2	clear	
3	9 a. m.	30 0	13 3	1 3	W. 2	clear	
	5 p. m.	30 0	14 9	1 0	N. W. 2	clear	
4	9 a. m.	30 0	13 5	1 5	N. W. 2	clear	
	7 p. m.	29 9	15 7	0 7	S. W. 2	clear	
5	8 a. m.	29 9	15 4	1 0	S. W. 2	clear	
	6 p. m.	29 9	15 4	1 0	S. W. 1	cloudy	
6	9 a. m.	29 9	14 6	1 0	W. 2	clear	
	5 p. m.	29 9	14 6	0 8	W. 2	clear	
7	9 a. m.	29 9	14 7	1 0	W. 1	cloudy	
	5 p. m.	29 8	14 8	0 9	N. E. 1	clear	
8	9 a. m.	29 8	13 7	1 5	E. 2	clear	
	5 p. m.	29 7	15 2	1 0	E. 2	clear	
9	9 a. m.	29 7	13 3	1 3	E. 2	clear	
	5 p. m.	29 6	14 1	1 3	E. 2	clear	
10	8 a. m.	29 6	13 2	2 0	N. E. 1	cloudy	
11	9 a. m.	29 7	13 0	1 9	N. E. 2	cloudy	
	4 p. m.	29 7	13 4	1 2	N. E. 2	clear	
12	8 a. m.	29 7	13 4	1 4	W. 2	clear	
	4 p. m.	29 7	14 6	1 3	W. 2	Rain	
13	8 a. m	29 6	13 1	3 1	N. E. 2	cloudy	
	5 p. m.	29 6	12 7	1 6	N. E. 2	clear --	0,615
14	9 a. m.	29 6	12 0	2 0	N. 2	cloudy -	0,052
	5 p. m.	29 6	13 6	1 4	N. W. 2	cloudy	
15	8 a. m.	29 6	12 9	1 6	W. 2	cloudy	
	5 p. m.	29 6	13 7	1 3	W. 2	clear	
16	8 a. m.	29 6	12 3	2 0	N. W. 2	Rain --	0,167
	5 p. m.	29 6	14 5	1 3	W. 2	clear	
							0,877

JUNE 1732.

D.	Hour.	Baro. In.	D.	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain.
											0,877
17	9 a. m.	29	7	13	4	1	4	W.	2	Cloudy	
	5 p. m.	29	7	14	7	1	5	W.	2	Rain	
18	9 a. m.	29	8	13	5	1	5	W.	2	cloudy	
	5 p. m.	29	8	14	5	1	2	W.	2	clear	
19	8 a. m.	29	7	13	8	1	7	S. W.	1	Rain	
	5 p. m.	29	6	13	3	2	0	E.	1	Rain	
20	8 a. m.	29	5	13	2	1	7	W.	2	clear --	0,244
	5 p. m.	29	4	14	5	1	2	W.	2	clear	
21	8 a. m.	29	4	13	7	1	4	W.	2	cloudy	
	5 p. m.	29	4	13	8	1	5	W.	1	lowring	
22	8 a. m.	29	5	13	4	1	7	N. W.	1	clear	
	5 p. m.	29	6	14	4	1	5	N. E.	1	cloudy	
23	8 a. m	29	8	14	1	1	7	N. E.	1	cloudy	
	5 p. m.	29	8	14	5	1	4	N. E.	1	clear	
24	8 a. m.	30	0	14	2	1	5	E.	2	clear --	0,075
	5 p. m.	30	1	14	3	1	5	E.	2	clear	
25	9 a. m.	30	2	14	7	1	7	E.	2	lowring	
	6 p. m.	30	2	14	7	1	6	E.	1	clear	
26	8 a. m.	30	3	13	9	2	4	E.	2	Fog	
	5 p. m.	30	3	15	4	1	5	E.	2	clear	
27	8 a. m.	30	3	15	0	1	4	E.	2	clear	
	4 p. m.	30	3	15	9	1	3	E.	2	clear	
28	8 a. m.	30	3	14	3	2	3	E.	2	lowring	
	3 p. m.	30	2	15	5	1	6	E.	2	clear	
29	8 a. m.	30	1	14	6	1	8	W.	2	lowring	
	8 p. m.	30	0	15	0	1	4	W.	2	clear	
30	8 a. m.	30	0	14	7	1	5	W.	2	clear --	-- --
	4 p. m.	30	0	15	6	1	2	W.	2	cloudy	
H. at a med.		29	8	14	1	1	4			Total Depth	1,196
Gr. Height		30	3	15	9	3	1				
L. Height		29	4	12	0	0	7				

JULY 1732.

D.	Hour.	Baro. In. D.	Ther. In. D.	Hyg. I. D.	Wind. Dir. For.	Weather.	Rain. In. D.
1	8 a. m.	30 1	14 4	1 7	N. W. 2	cloudy -	0,045
	6 p. m.	30 1	15 5	1 2	N. W. 1	clear	
2	9 a. m.	30 0	15 0	1 3	N. W. 2	clear	
	4 p. m.	29 8	15 3	1 2	W. 3	lowring	
3	8 a. m.	29 6	13 4	1 4	W. 3	clear	
	4 p. m.	29 7	13 7	1 0	N. 2	clear	
4	9 a. m.	29 7	12 5	1 1	W. 3	clear	
	5 p. m.	29 7	14 3	0 9	N. W. 2	clear	
5	8 a. m.	29 8	13 0	1 1	N. W. 1	clear	
	6 p. m.	29 8	15 3	1 1	N. W. 1	clear	
6	8 a. m.	29 8	14 4	1 8	W. 1	lowring	
	5 p. m.	29 8	15 5	1 3	W. 2	Fog	
7	8 a. m.	29 6	15 2	1 6	S. W. 3	lowring	
	5 p. m.	29 6	16 1	1 4	S. W. 2	lowring	
8	9 a. m.	29 4	15 4	1 3	S. W. 3	lowring	
	5 p. m.	29 5	15 1	1 0	S. W. 3	clear	
9	9 a. m.	29 5	14 4	1 4	S. W. 1	lowring	
	4 p. m.	29 4	15 1	1 2	S. W. 1	lowring	
10	7 a. m.	29 3	13 4	1 6	S. W. 2	clear	
	6 p. m.	29 2	12 7	1 8	E. 2	gr. Rain	
11	8 a. m.	29 3	12 3	2 5	W. 2	lowring	0,685
	5 p. m.	29 3	13 9	1 3	W. 2	clear	
12	8 a. m.	29 4	13 3	1 7	W. 1	clear	0,193
	4 p. m.	29 4	13 7	1 6	N. E. 1	clear	
13	8 a. m	29 3	11 7	3 2	N. E. 1	clear	
	5 p. m.	29 3	12 6	3 6	N. E. 2	cloudy	
14	8 a. m.	29 4	12 7	3 1	S. E. 2	cloudy -	0,367
	5 p. m.	29 5	13 2	2 9	S. E. 2	cloudy	
15	8 a. m.	29 7	13 6	2 2	S. E. 2	Rain	
	5 p. m.	29 8	15 2	2 0	S. 2	lowring	
16	9 a. m.	29 9	14 8	2 0	S. 1	lowring	
	6 p. m.	29 9	15 4	1 7	E. 0	clear	
							1,290

JULY 1732.

D.	Hour.	Baro. In.	D.	Ther. in.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain.
											1,290
17	8 a. m.	29	9	14	3	1	8	N. W.	1	Clear	
	5 p. m.	29	9	15	3	1	6	N. W.	2	clear	
18	9 a. m.	29	9	13	4	1	6	N. W.	2	clear	
	5 p. m.	29	9	14	3	1	6	N. E.	2	cloudy	
19	8 a. m.	29	9	13	5	1	9	N. E.	2	clear	
	5 p. m.	29	9	14	7	1	5	N. E.	2	clear	
20	9 a. m.	29	9	13	8	1	7	W.	2	clear	
	7 p. m.	29	8	14	7	1	6	W.	2	cloudy	
21	9 a. m.	29	6	14	3	2	1	S. W.	2	Rain - -	0,632
	5 p. m.	29	5	15	4	1	8	W.	2	cloudy	
22	8 a. m.	29	6	12	6	3	0	W.	2	lowring	0,140
	5 p. m.	29	6	13	7	2	5	E.	2	lowring	
23	9 a. m.	29	2	12	4	3	3	N.	3	gr. Rain	
	5 p. m.	29	5	12	5	2	3	N. W.	2	clear	
24	8 a. m.	29	6	12	3	2	2	N.b.W.	2	clear --	0,273
	5 p. m.	29	7	13	6	1	7	W.b.N.	2	clear	
25	8 a. m.	29	8	13	0	1	9	W.b.N.	2	clear	
	5 p. m.	29	8	14	2	1	5	N. E.	1	clear	
26	9 a. m.	29	8	13	3	1	6	N. W.	2	clear --	0,642
	4 p. m.	29	8	13	4	1	6	N.	1	cloudy	
27	9 a. m.	29	7	13	0	1	8	N.	1	clear	
	5 p. m.	29	7	14	9	1	5	S. W.	1	cloudy	
28	9 a. m.	29	7	13	9	1	5	W.	2	clear - -	0,157
	4 p. m.	29	7	14	3	1	3	W.	2	clear	
29	9 a. m.	29	8	13	9	1	6	W.b.N.	2	clear - -	0,026
	5 p. m.	29	8	14	4	1	2	W.	1	cloudy	
30	9 a. m.	29	7	14	3	2	5	W.b.N.	2	cloudy	
	4 p. m.	29	7	14	3	2	5	W.b.N.	2	cloudy	
31	10 a. m.	29	6	13	6	1	4	W.b.N.	2	clear - -	0,039
	5 p. m.	29	7	14	2	1	1	N. W.	1	clear	
H. at a med.		29	7	13	9	1	7			Total Depth	3,199
Gr. Height		30	1	16	1	3	6				
L. Height		29	2	11	7	0	9				

AUGUST 1732.

D.	Hour.	Baro. In. D.	Ther. In. D.	Hyg. I. D.	Wind. Dir. For.	Weather.	Rain. In. D.
1	9 a. m.	29 8	13 0	1 2	N. W. 0	Clear - -	- -
	5 p. m.	29 8	13 9	1 1	N. E. 1	clear	
2	8 a. m.	29 9	13 1	1 6	S. W. 1	clear- -	- -
	5 p. m.	29 9	14 1	1 2	N. 1	clear	
3	8 a. m.	30 0	13 5	1 5	N. W. 1	clear - -	- -
	5 p. m.	30 0	14 8	1 3	N. 1	clear	
4	9 a. m.	30 0	13 7	1 6	S. 1	clear - -	- -
	5 p. m.	30 0	14 9	1 1	S. E. 1	clear	
5	8 a. m.	30 0	13 9	1 5	S. E. 1	clear	
	6 p. m.	29 9	15 6	1 1	S. E. 0	Cl. high	
6	10 a. m.	30 0	13 7	2 5	E. 1	cloudy	
	6 p. m.	30 0	14 4	1 8	E. 1	clear	
7	8 a. m.	29 9	13 8	2 3	S. E. 0	Fog	
	5 p. m.	29 9	15 0	1 7	S. E. 1	clear	
8	8 a. m.	29 8	13 0	2 5	W. 1	lowring	
	5 p. m	29 6	14 6	1 4	W. 2	clear	
9	9 a. m.	29 5	13 2	2 0	W. 2	cloudy	
	5 p. m.	29 5	13 6	1 9	E. 0	cloudy	
10	8 a. m.	29 5	12 2	1 7	N. W. 2	cloudy	
	5 p. m.	29 5	13 3	1 1	N. W. 2	cloudy	
11	9 a. m.	29 6	11 9	1 4	N. W. 2	cloudy	
	7 p. m.	29 7	11 5	1 4	E. 2	cloudy	
12	9 a. m.	29 5	12 0	1 4	S. W. 0	cloudy	0,365
	5 p. m.	29 4	12 9	1 5	W. 1	lowring	
13	9 a. m.	29 3	12 5	2 0	N. E. 1	lowring	
	6 p. m.	29 3	12 0	3 1	N. E. 2	gr. Rain	
14	8 a. m.	29 5	11 7	3 4	N. E. 1	cloudy	
	5 p. m.	29 5	12 7	2 0	N. W. 1	clear	
15	8 a. m.	29 6	12 0	2 1	W. b. S. 2	clear	
	5 p. m.	29 5	13 2	1 5	W. 2	clear	
16	7 a. m.	29 6	12 1	1 7	W. b. S. 1	clear	
	5 p. m.	29 6	13 4	1 3	W. 2	clear	
							0,365

AUGUST 1732.

D.	Hour.	Baro. In.	D.	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain.
											0,365
17	8 a. m.	29	7	12	3	1	7	N. W.	1	Clear	
	5 p. m.	29	7	14	0	1	2	W.	1	cloudy	
18	8 a. m.	29	7	13	5	1	6	S. W.	2	clear	
	5 p. m.	29	6	14	9	1	6	S.	2	cloudy	
19	8 a. m.	29	5	14	0	1	9	N. W.	2	cloudy	
	6 p. m.	29	5	14	3	1	5	W. b. N.	2	clear	
20	8 a. m.	29	6	13	6	2	0	S. W.	1	Rain	0,432
	6 p. m.	29	5	14	0	2	0	S.	2	cloudy	
21	9 a. m.	29	4	14	5	1	8	S. W.	2	cloudy	
	5 p. m.	29	5	15	0	1	6	S. W.	2	clear	
22	9 a. m.	29	7	12	2	1	8	N. E.	2	cloudy	
	6 p. m.	29	7	12	7	1	5	E. b. N.	2	clear	
23	8 a. m.	29	6	12	4	1	8	E.	1	Rain	
	5 p. m.	29	5	13	5	1	7	S. W.	0	Rain	
24	8 a. m.	29	8	12	5	2	1	W.	2	clear	
	4 p. m.	29	9	13	7	1	3	W.	2	clear	
25	8 a. m.	29	9	13	5	1	5	S. W.	1	clear	
	5 p. m.	29	8	14	2	1	5	S. W.	2	Rain	
26	8 a. m.	29	7	14	6	1	7	S. W.	2	cloudy	
	5 p. m.	29	7	13	6	2	0	W.	2	Rain	
27	9 a. m.	29	9	12	6	1	8	W. b. N.	2	clear	
	6 p. m.	30	0	13	7	1	2	W. b. N.	2	clear	
28	8 a. m.	31	0	12	4	1	5	N. W.	0	cloudy	
	5 p. m.	31	0	13	0	1	3	N. E.	2	clear	
29	7 a. m.	31	0	11	6	1	5	N. E.	1	clear	
	5 p. m.	30	1	12	4	1	4	E.	1	clear	
30	9 a. m.	30	0	12	6	1	8	S. W.	1	clear	
	5 p. m.	30	0	14	2	1	5	W.	1	clear	
31	9 a. m.	30	0	12	7	1	5	W.	2	clear	0,828
H. at a med.		29	9	13	3	1	6			Total Depth	1,625
Gr. Height		31	1	15	6	3	4				
L. Height		29	3	11	5	1	1				

SEPTEMBER 1732.

D.	Hour.	Baro. In. D.	Ther. In. D.	Hyg. I. D.	Wind. Dir. For.	Weather.	Rain. In. D.
1	8 a. m.	30 2	12 3	1 6	N. W. 1	Clear	
	4 p. m.	30 2	14 0	1 3	N. W. 1	clear	
2	8 a. m.	30 2	12 4	2 0	N. E. 1	clear	
	4 p. m.	30 3	14 2	1 4	N. E. 1	clear	
3	9 a. m.	30 3	12 5	2 5	E. 1	Miſt	
	6 p. m.	30 3	12 7	2 5	E. 1	Miſt	
4	8 a. m.	30 2	11 7	2 7	N. 0	Miſt	
	5 p. m.	30 1	13 6	1 8	N. 1	Miſt	
5	8 a. m.	30 1	12 2	2 9	N. E. 0	Miſt	
	5 p. m.	30 0	13 3	2 6	N. E. 1	Miſt	
6	8 a. m.	29 8	12 6	2 0	S. W. 2	clear	
	5 p. m.	29 7	14 2	1 4	W. 2	cloudy	
7	8 a. m.	29 8	12 8	1 9	E. 0	cloudy	
	4 p. m.	29 9	13 6	1 6	E. 0	cloudy	
8	8 a. m	29 7	13 3	1 9	S. E. 1	cloudy	
	4 p. m	29 6	14 6	1 5	S. W. 0	clear	
9	9 a. m.	29 5	13 9	1 7	S. W. 0	cloudy	
	6 p. m.	29 5	12 7	1 8	S. W. 1	cloudy	
10	9 a. m.	29 5	12 7	1 7	S. W. 1	cloudy	
	6 p. m.	29 2	13 6	1 6	S. W. 3	lowring	
11	9 a. m.	29 2	13 0	1 6	S. W. 3	clear	
	5 p. m.	28 6	12 5	1 6	S. W. 4	Tempeſt	
12	9 a. m.	28 8	12 1	1 6	W. 3	cloudy	
	4 p. m.	29 0	12 1	1 4	N. W. 2	clear	
13	8 a. m.	28 8	10 5	1 8	W. 2	clear	
	6 p. m.	28 9	11 7	1 6	W. 2	cloudy	
14	8 a. m.	29 1	10 8	1 5	N. b. W. 2	clear	
	4 p. m.	29 2	12 1	1 1	N. W. 3	cloudy	
15	8 a. m.	28 9	11 8	1 3	S. W. 2	Rain	
	5 p. m.	28 8	11 5	1 5	S. W. 2	Rain	
16	8 a. m.	29 5	10 3	1 5	N. 1	fair	
	5 p. m.	29 6	11 6	1 1	W. 2	fair	

The Regiſter of Rain was not kept this Month.

SEPTEMBER 1732.

D.	Hour.	Baro. In.	D.	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain.
17	9 a. m.	29	0	11	8	1	7	N. W.	2	Fair	
	5 p. m.	29	0	10	7	1	5	W.	3	fair	
18	8 a. m.	28	9	11	5	1	8	W.	3	fair	
	7 p. m.	29	1	11	4	1	8	W.	2	fair	
19	8 a. m.	29	3	10	8	2	0	W.	1	fair	
	7 p. m.	29	4	10	8	1	7	W.	1	fair	
20	8 a. m.	29	7	10	3	1	8	W.	1	fair	
21	8 a. m.	29	5	12	8	1	6	W.	4	Storm	
	4 p. m.	29	6	13	0	1	3	W.	4	Storm	
22	8 a. m.	29	8	11	8	1	5	S. W.	2	cloudy	
	4 p. m.	29	7	12	6	1	6	S. W.	2	cloudy	
23	8 a. m	29	7	11	5	2	0	W.	1	cloudy	
24	9 a. m.	29	6	13	2	2	1	S. W.	0	cloudy	
	5 p. m.	29	7	13	7	2	1	S. W.	0	Rain	
25	8 a. m.	29	8	12	3	2	1	W.	2	fair	
	5 p. m.	30	0	13	1	1	5	W.	0	fair	
26	8 a. m.	30	2	11	8	2	0	S. E.	0	fair	
	5 p. m.	30	3	11	9	1	7	E.	1	fair	
27	8 a. m.	30	2	11	8	1	7	E.	1	cloudy	
	5 p. m.	30	0	12	4	1	5	S. E.	2	cloudy	
28	8 a. m.	29	9	11	4	1	5	S. E.	1	cloudy	
	5 p. m.	29	9	12	1	1	5	S. E.	1	cloudy	
29	8 a. m.	30	1	10	5	1	7	S. E.	0	fair	
	5 p. m.	30	1	11	9	1	5	S. E.	1	fair	
30	8 a. m.	30	2	9	8	1	6	S. E.	0	fair	
	5 p. m.	30	2	11	2	1	4	S. E.	1	fair	
H. at a med.		29	6	12	2	1	7				
Gr. Height		30	3	14	6	2	9				
L. Height		28	3	9	8	1	1				

OCTOBER 1732.

D.	Hour.	Baro. In. D.	Ther. In D.	Hyg. I. D.	Wind. Dir. For.	Weather.	Rain. In. D.
1	9 a. m.	30 1	10 8	1 4	S. E. 1	Fair	
	5 p. m.	30 0	11 1	1 3	S. E. 1	Fog	
2	8 a. m.	29 9	10 4	1 5	S. E. 1	cloudy	0,062
	5 p. m.	29 7	11 3	1 6	E. 1	cloudy	
3	8 a. m.	29 4	10 8	1 5	E. 1	cloudy	
	5 p. m.	29 2	10 7	2 6	N. E. 2	Rain	
4	9 a. m.	29 1	10 4	3 0	N. E. 1	fair	
	5 p. m.	29 2	10 9	2 4	W. 1	cloudy	
5	9 a. m.	29 2	9 9	2 4	S. W. 1	fair	
	4 p. m.	29 1	11 2	2 1	E. 1	Rain	
6	8 a. m.	29 3	9 8	2 3	N. W. 1	clear	0,213
	5 p. m.	29 3	11 0	1 5	W. b. N. 1	clear	
7	9 a. m.	29 3	10 4	2 0	S. E. 1	Rain	
	5 p. m.	29 1	11 4	2 2	S. E. 1	Rain	
8	9 a. m.	29 1	11 1	2 5	S. W. 1	fair	
	5 p. m.	29 2	11 9	2 0	S. W. 1	cloudy	
9	8 a. m.	29 0	12 1	2 3	S. 1	fair	
	5 p. m.	29 0	12 7	1 8	S. b. W. 1	fair	
10	8 a. m.	29 0	11 7	2 0	S. W. 2	fair	
	4 p. m.	29 1	11 6	1 8	W. 3	fair	
11	9 a. m.	29 2	10 5	1 9	S. E. 2	Fog	
	4 p. m.	29 0	11 9	2 2	S. W. 1	cloudy	
12	9 a. m.	29 1	11 4	2 2	S. W. 0	Fog	
	5 p. m.	29 0	11 9	2 5	S. b. E. 1	Rain	
13	8 a. m.	29 1	10 4	2 5	S. W. 0	cloudy -	0,685
	4 p. m.	29 0	11 1	2 7	W. 1	Rain	
14	8 a. m.	29 4	10 4	2 2	S. W. 1	fair	
	5 p. m.	29 4	10 5	2 2	S. b. W. 1	fair	
15	9 a. m.	29 2	11 4	2 7	S. b. W. 1	cloudy	
	4 p. m.	29 0	12 2	2 0	S. b. W. 0	cloudy	
16	8 a. m.	29 4	10 6	2 5	S. W. 0	fair - -	0,426
	5 p. m.	29 2	11 3	2 2	S. W. 1	Rain	
							1,386

OCTOBER 1732.

D.	Hour.	Baro. In.	D.	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain.
											1,386
17	8 a. m.	29	0	11	6	2	3	S. W.	2	Cloudy	
	5 p. m.	28	9	11	8	2	0	S. W.	2	cloudy	
18	8 a. m.	29	0	10	9	2	1	S. W.	2	fair	
	5 p. m.	29	1	10	6	2	1	S. W.	2	cloudy	
19	8 a. m.	29	4	10	8	2	1	S. W.	0	Fog - -	0,395
	5 p. m.	29	5	11	4	2	3	E.	1	cloudy	
20	9 a. m.	29	5	10	8	3	0	N. W.	0	cloudy	
	5 p. m.	29	5	10	7	3	0	N. E.	0	cloudy	
21	8 a. m.	29	4	10	7	2	9	S. E.	1	cloudy	
	5 p. m.	29	4	11	1	2	5	S. E.	1	fair	
22	9 a. m.	29	5	11	3	2	3	S. W.	1	cloudy	
	5 p. m.	29	5	11	6	2	2	S. W.	1	cloudy	
23	8 a. m.	29	7	10	6	2	5	S. E.	1	fair	
	4 p. m.	29	7	11	4	3	0	E.	2	cloudy	
24	9 a. m.	29	6	11	2	3	7	N. E.	2	Rain	
	5 p. m.	29	6	11	5	3	9	N. E.	2	Rain	
25	9 a. m.	29	5	11	9	3	9	S. E.	1	Fog	
	5 p. m.	29	6	11	8	3	9	S. E.	1	Fog	
26	9 a. m.	29	5	12	3	2	6	S. E.	1	fair - -	0,530
	5 p. m.	29	5	12	3	2	9	S. E.	1	fair	
27	9 a. m.	29	7	11	5	3	6	S. E.	1	Fog	
	4 p. m.	29	6	11	6	3	4	S. E.	1	Fog	
28	9 a. m.	29	4	11	3	2	6	W.	2	cloudy	
	4 p. m.	29	4	10	6	2	1	W.	1	fair	
29	8 a. m.	29	6	9	5	2	4	W.	1	fair	
	4 p. m.	29	7	10	4	2	2	N. W.	2	fair	
30	9 a. m.	29	8	10	2	2	5	W.	1	cloudy -	0,212
	5 p. m.	29	9	10	5	2	5	W.	1	cloudy	
31	8 a. m.	29	9	10	5	2	4	W.	0	cloudy	
	5 p. m.	29	9	10	7	2	1	S. W.	1	cloudy	
H. at a med.		29	3	11	1	2	4			Total Depth	2,523
Gr. Height		30	1	12	7	3	9				
L. Height		28	9	9	5	1	3				

NOVEMBER 1732.

D.	Hour.	Baro. In. D.	Ther. In. D.	Hyg. I. D.	Wind. Dir. For.	Weather.	Rain. In. D.
1	8 a. m.	29 9	9 9	2 1	S. 0	Fair	
	5 p. m.	29 9	10 3	2 3	S. 0	fair	
2	8 a. m.	29 9	10 0	2 3	S. E. 2	cloudy	
	5 p. m.	30 0	9 5	2 1	S. E. 1	cloudy	
3	8 a. m.	30 1	9 4	2 2	S. E. 1	Fog	
	5 p. m.	30 1	10 0	2 2	S. E. 1	Fog	
4	9 a. m.	30 1	9 5	2 2	S. E. 1	cloudy	
	5 p. m.	30 1	9 7	2 2	S. E. 1	cloudy	
5	9 a. m.	30 1	8 3	2 2	S. W. 0	cloudy	
	5 p. m.	30 1	9 0	2 3	S. W. 0	fair	
6	8 a. m.	30 2	8 2	2 4	S. W. 0	fair	
	5 p. m.	30 2	9 6	2 1	S. W. 0	fair	
7	8 a. m.	30 2	9 3	2 8	S. W. 2	fair	
	5 p. m.	30 3	9 4	2 8	S. W. 0	Fog	
8	8 a. m.	30 3	8 7	3 1	W. 1	Fog	
	5 p. m.	30 3	9 2	3 3	W. 1	Fog	
9	8 a. m.	30 2	9 7	3 2	W. 1	Fog - -	0,025
	5 p. m.	30 1	9 9	3 0	W. 0	Fog	
10	9 a. m.	30 0	9 9	3 0	W. 0	Fog	
	5 p. m.	29 7	9 9	2 9	W. 0	Fog	
11	8 a. m.	29 6	9 1	2 8	S. 1	cloudy	
	5 p. m.	29 5	9 5	2 8	S. E. 1	fair	
12	9 a. m.	29 6	10 4	2 9	S. E. 1	Fog	
	4 p. m.	29 7	10 5	2 6	S. E. 1	Fog	
13	9 a. m.	29 7	10 9	2 9	S. E. 1	Rain --	0,075
	5 p. m.	29 7	10 2	2 7	S. E. 2	Fog	
14	9 a. m.	29 8	9 5	3 5	S. E. 2	cloudy -	0,257
	5 p. m.	29 9	9 7	3 4	N. W. 2	cloudy	
15	9 a. m.	29 8	8 7	2 3	N. b. W. 3	cloudy -	0,033
	5 p. m.	29 8	8 4	2 0	N b. W. 2	cloudy	
16	9 a. m.	29 7	9 1	2 0	N. E. 3	fair	
	5 p. m.	29 8	8 7	1 8	N. 3	fair	
							0,390

NOVEMBER 1732.

D.	Hour.	Baro. In.	D.	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain.
											0,390
17	9 a. m.	29	8	8	3	1	8	W.	2	Fair	
	5 p. m.	29	4	9	5	1	7	W. b. S.	2	fair	
18	9 a. m.	29	5	7	2	1	9	N. W.	1	fair	
	5 p. m.	29	5	7	4	1	9	N. W.	1	fair	
19	9 a. m.	29	4	6	7	2	0	N. W.	1	fair	
	4 p. m.	29	5	7	7	1	8	N. W.	3	fair	
20	9 a. m.	29	8	7	5	1	9	N. W.	1	cloudy	
	5 p. m.	29	9	8	3	1	7	N. W.	2	cloudy	
21	9 a. m.	30	0	7	4	2	0	N. W.	0	fair - -	0,012
	5 p. m.	30	0	9	0	2	0	S.	1	cloudy	
22	9 a. m.	30	1	10	5	2	9	S.	1	cloudy	
	5 p. m.	30	2	10	6	3	2	S.	0	cloudy	
23	9 a. m.	30	3	10	4	3	0	W.	1	cloudy -	0,005
	5 p. m.	30	4	10	4	2	9	W.	1	cloudy	
24	9 a. m.	30	4	10	4	2	7	N. W.	1	fair	
	4 p. m.	30	4	9	9	2	7	W.	1	fair	
25	9 a. m.	30	4	9	9	2	9	W.	1	fair	
	4 p. m.	30	4	9	6	2	9	W.	1	fair	
26	9 a. m.	30	3	10	1	2	9	W.	1	fair - -	0,008
	5 p. m.	30	2	10	4	2	7	W.	1	fair	
27	9 a. m.	30	0	10	1	2	8	W.	1	fair	
	5 p. m.	30	0	9	5	2	5	N. b. W.	1	fair	
28	9 a. m.	30	1	7	4	2	0	N. b. W.	1	fair	
	5 p. m.	30	1	8	3	1	9	N. b. W.	2	fair	
29	9 a. m.	29	8	9	9	2	5	W. b. S.	3	Cloudy	
	3 p. m.	29	8	10	5	2	5	W. b. S.	3	cloudy	
30	9 a. m.	29	7	9	0	1	4	W.	2	clou y	
	5 p. m.	29	9	9	2	2	1	W.	2	clou y	
H. at a med.		29	8	9	3	2	4			Total Depth	0,415
Gr. Height		30	4	10	6	3	5				
L. Height		29	4	7	2	1	4				

DECEMBER 1732.

D.	Hour.	Baro. In.	D	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain. In.	D.
1	9 a. m.	30	1	8	2	2	3	W.	2	Fair		
	5 p. m.	30	1	8	8	2	4	W.	2	fair		
2	9 a. m.	30	1	8	9	1	9	N. W.	2	fair		
	4 p. m.	30	1	8	7	1	9	N. W.	2	fair		
3	9 a. m.	30	1	9	0	2	0	S. W.	2	cloudy		
	5 p. m.	29	9	9	7	2	2	S. W.	2	cloudy		
4	9 a. m.	29	6	10	0	2	6	W.	2	fair		
	5 p. m.	29	7	8	8	2	2	N. W.	1	fair		
5	9 a. m.	29	8	9	0	2	2	N.	1	fair		
	5 p. m.	29	9	9	1	2	1	N.	1	fair		
6	9 a. m.	30	0	8	0	2	0	N.	1	fair		
	5 p. m.	30	0	7	7	2	5	N. b. W.	0	fair		
7	9 a. m.	30	1	7	0	3	0	N.	1	fair		
	5 p. m.	30	3	8	5	2	4	N.	1	Fog		
8	9 a. m.	30	4	9	1	2	3	E.	1	Fog		
	5 p. m.	30	4	9	1	2	3	E.	1	fair		
9	9 a. m.	30	3	9	1	2	3	E. b. S,	2	fair		
	5 p. m.	30	3	9	1	2	3	S. E.	2	Fog - -	0,032	
10	9 a. m.	30	2	8	7	2	0	S. E.	2	fair		
	4 p. m.	30	1	9	2	2	1	S. E.	2	fair		
11	9 a. m.	29	9	7	0	2	2	S. E.	1	Fog		
	5 p. m.	29	8	7	5	2	3	S. E.	2	fair		
12	9 a. m,	29	8	7	5	2	5	S. E.	0	Fog		
	5 p. m.	29	8	8	0	2	5	S. E.	1	Fog		
13	9 a. m.	29	9	8	5	2	6	S. E.	1	Fog		
	5 p. m.	29	9	8	7	2	3	S. E.	0	Fog		
14	9 a. m.	29	8	6	7	2	5	S.	2	fair		
	5 p. m.	29	7	6	6	2	4	S.	1	fair		
15	9 a. m.	29	7	7	4	2	4	S.	1	Fog		
	5 p. m.	29	6	7	5	3	0	S.	1	Fog		
16	9 a. m.	29	6	8	1	3	0	S. E.	1	Fog		
	5 p. m.	29	6	8	4	2	5	S. E.	1	fair		
											0,032	

DECEMBER 1732.

D.	Hour.	Baro. In.	D.	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain.
											0,032
17	9 a. m.	29	5	9	2	2	8	S.	1	Fair	
	4 p. m.	29	5	9	4	2	7	S.	1	fair	
18	9 a. m.	29	4	8	8	3	1	W. b. S.	1	Fog	
	5 p. m.	29	4	8	1	3	1	W. b. S.	1	Fog	
19	9 a. m.	29	3	8	3	3	3	S. b. E.	1	Fog - -	0,095
	5 p. m.	29	3	9	0	3	4	S. b. E.	0	Fog	
20	9 a. m.	29	2	9	1	3	3	S.	0	Fog - -	0,210
	5 p. m.	29	1	9	5	3	2	S.	0	Fog	
21	9 a. m.	29	3	10	0	3	0	S.	0	Fog - -	0,172
	5 p. m.	29	0	10	3	3	2	W.	0	Fog	
22	9 a. m.	28	9	10	0	3	4	E.	2	Rain - -	0,395
	5 p. m.	29	1	9	8	3	8	E.	2	Rain	
23	9 a. m.	29	5	9	4	3	6	E.	2	Rain - -	0,350
	5 p. m.	29	6	9	5	3	3	E.	2	Rain	
24	9 a. m.	29	6	10	4	3	3	S.	3	Rain - -	0,410
	4 p. m.	29	5	11	8	3	0	S.	3	cloudy	
25	9 a. m.	29	5	10	5	2	3	S. W.	0	cloudy	0,382
	5 p. m.	29	4	11	3	3	0	S. W.	1	cloudy	
26	9 a. m.	29	4	10	5	2	7	S. W.	1	cloudy	0,256
	4 p. m.	29	4	10	3	2	5	S. W.	1	cloudy	
27	9 a. m.	29	3	9	4	2	7	S. W.	2	cloudy	0,210
	4 p. m.	29	3	10	1	2	8	S. W.	2	cloudy	
28	9 a. m.	29	2	9	6	3	0	S. W.	2	cloudy	0,457
	5 p. m.	29	1	9	5	2	6	W.	2	cloudy	
29	9 a. m.	28	8	9	0	2	7	W.	2	Snow -	0,365
	5 p. m.	28	6	9	8	2	5	S. W.	2	cloudy	
30	9 a. m.	28	2	10	6	2	5	S. W.	3	Rain - -	0,198
	4 p. m.	28	2	10	5	2	5	S. W.	3	cloudy	
31	9 a. m.	28	8	10	0	2	4	N. W.	2	fair - -	0,085
	4 p. m.	29	0	9	5	2	0	W.	2	fair	
H. at a med.		29	8	9	1	2	6			Total Depth	3,617
Gr. Height		30	4	11	8	3	8				
L. Height		28	2	6	6	1	9				

JANUARY 1733.

D.	Hour.	Baro. In.	D	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain. In.	D.
1	9 a. m.	29	3	9	4	2	2	N. W.	2	Fair		
	5 p. m.	29	6	8	6	2	1	W.b.N.	2	fair		
2	9 a. m.	29	5	9	6	2	3	S. W.	2	Rain -	0,054	
	4 p. m.	29	3	10	6	2	5	S. W.	2	cloudy		
3	9 a. m.	29	4	9	7	2	3	S. W.	2	fair - -	0,135	
	5 p. m.	29	3	9	8	2	3	S. W.	3	cloudy		
4	9 a. m.	29	1	10	6	2	2	S. W.	3	Rain -	0,217	
	5 p. m.	29	0	11	7	2	3	S. W.	4	cloudy		
5	9 a. m.	29	2	10	6	2	0	S. W.	3	fair		
	5 p. m.	29	3	10	7	2	0	S. W.	2	Rain		
6	9 a. m.	29	5	9	9	2	0	S. W.	2	fair - -	0,190	
	4 p. m.	29	6	10	0	2	0	S. W.	2	fair		
7	9 a. m.	29	7	10	3	2	1	S.	2	fair - -	0,083	
	4 p. m.	29	6	10	2	2	0	S.	2	Fog		
8	9 a. m.	29	2	10	8	2	4	S. W.	1	Rain		
	5 p. m.	29	2	10	3	2	2	W.	2	fair		
9	9 a. m.	29	2	9	2	2	4	W.	2	fair - -	0,225	
	5 p. m.	29	2	10	2	2	2	W.	2	fair		
10	9 a. m.	29	4	9	3	2	3	W.	2	fair		
	5 p. m.	29	5	9	5	2	1	S. W.	3	fair		
11	9 a. m.	29	5	10	0	2	2	S. W.	2	cloudy		
	5 p. m.	29	5	10	1	2	0	S. W.	2	cloudy		
12	9 a. m,	29	5	8	7	2	1	E.	1	fair - -	0,053	
	5 p. m.	29	6	9	6	2	0	E.	1	cloudy		
13	9 a. m.	29	6	9	1	2	1	S.	1	fair		
	5 p. m.	29	6	9	4	2	0	S. W.	1	fair		
14	9 a. m.	29	6	8	3	2	2	S. W.	1	cloudy		
	5 p. m.	29	6	8	4	2	1	S. W.	1	Fog		
15	9 a. m.	29	6	9	4	2	3	S.	1	fair		
	5 p. m.	29	6	9	2	2	1	S. W.	2	fair		
16	9 a. m.	29	7	10	8	2	2	S.	2	cloudy		
	5 p. m.	29	7	10	7	2	2	S.	1	cloudy		
											0,957	

JANUARY 1733.

D.	Hour.	Baro. In.	D.	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather	Rain.
											0,957
17	9 a. m.	29	8	10	7	2	2	S. W.	1	Rain	
	5 p. m.	29	9	10	4	2	6	S. W.	1	Rain	
18	9 a. m.	30	0	10	3	2	4	S. W.	1	cloudy	
	5 p. m.	30	1	10	4	2	4	S. W.	2	cloudy	
19	9 a. m.	30	1	9	3	2	3	S.	2	fair - -	0,093
	5 p. m.	30	1	7	7	2	0	S. W.	1	fair	
20	9 a. m.	30	1	7	7	1	6	W.	1	fair	
	5 p. m.	30	1	8	2	1	5	S.	1	fair	
21	9 a. m.	30	2	7	0	1	7	S.	1	fair	
	5 p. m.	30	2	8	5	1	8	S.	2	fair	
22	9 a. m.	30	2	7	8	2	1	S. E.	2	fair	
	5 p. m.	30	2	8	2	1	9	S. E.	2	fair	
23	9 a. m.	30	1	8	4	2	2	S. E.	2	fair	
	5 p. m.	30	1	10	2	2	3	S. W.	2	cloudy	
24	9 a. m.	30	0	11	1	2	3	S. W.	2	cloudy	
	4 p. m.	30	1	11	6	2	2	S. W.	2	cloudy -	0,055
25	9 a. m.	30	0	11	1	2	2	S. W.	2	fair	
	5 p. m.	29	9	12	1	2	2	S. W.	3	fair	
26	9 a. m.	30	0	10	8	2	1	S. W.	3	fair	
	5 p. m.	30	1	11	2	2	0	S. W.	2	fair	
27	9 a. m.	30	1	10	4	2	2	S. W.	1	Rain * -	0,106
	4 p. m.	30	1	10	4	2	4	S. W.	2	fair	
28	9 a. m.	30	2	9	9	2	4	S. W.	1	cloudy	0,091
	5 p. m.	30	1	10	2	2	3	S. W.	1	cloudy	
29	9 a. m.	29	6	10	7	2	0	S. W.	2	cloudy	
	5 p. m.	29	3	11	2	2	1	S. W.	3	cloudy	
30	9 a. m.	29	1	10	5	2	1	S. W.	4	fair - -	0,068
	5 p. m.	29	3	10	1	1	9	S. W.	3	fair	
31	9 a. m.	29	0	9	1	1	9	S. W.	3	fair	
	5 p. m.	29	1	9	7	1	9	S. W.	2	fair	
H. at a med.		29	8	9	6	2	1			Total Depth	1,370
Gr. Height		30	2	12	1	2	6				
L. Height		29	0	7	0	1	5				

* Rain when Mercury is at 30 1 is very extraordinary.

FEBRUARY 1733.

D.	Hour.	Baro. In. D	Ther. In. D.	Hyg. I. D.	Wind. Dir. For.	Weather.	Rain. In.D.
1	9 a. m.	29 2	10 6	2 2	S. W. 4	Rain - -	0,135
	5 p. m.	29 1	11 4	2 2	S. W. 4	Rain	
2	9 a. m.	28 9	10 1	2 2	S. W. 2	cloudy -	0,193
	5 p. m.	29 0	9 2	2 3	S. W. 2	cloudy	
3	9 a. m.	29 2	9 7	2 1	S. W. 3	fair - -	0,233
	5 p. m.	29 1	9 8	2 1	S. W. 2	fair	
4	9 a. m.	28 9	9 5	2 1	S. W. 3	fair - -	0,089
	4 p. m.	28 8	10 0	1 7	S. W. 3	cloudy	
5	9 a. m.	29 0	9 6	2 0	W. 2	fair	
	5 p. m.	29 4	10 6	1 8	N. W. 2	fair - -	0,063
6	9 a. m.	29 8	9 2	2 3	W. 2	fair	
	5 p. m.	29 8	10 3	2 2	S. W. 2	cloudy	
7	9 a. m.	29 6	10 8	2 2	S. W. 2	cloudy	
	5 p. m.	29 6	10 6	2 0	W. 2	Rain	
8	9 a. m.	29 4	9 5	2 2	E. 1	Rain	
	5 p. m.	29 3	8 8	3 0	N. E. 3	Rain	
9	9 a. m.	29 4	9 0	2 6	N. 2	fair - -	0,514
	5 p. m.	29 5	9 6	2 0	N. 1	fair	
10	9 a. m.	29 6	8 5	2 4	N. 1	fair	
	5 p. m.	29 6	10 0	2 3	W. 2	fair	
11	9 a. m.	29 3	11 3	2 5	S. W. 3	cloudy	
	5 p. m.	29 3	11 0	2 3	W. 3	cloudy	
12	9 a. m,	29 5	9 4	2 2	S. W. 3	cloudy	
	5 p. m.	29 6	10 3	2 1	W. 3	cloudy	
13	9 a. m.	29 4	11 2	2 2	S. W. 3	fair	
	5 p. m.	29 4	11 7	2 0	S. W. 3	cloudy	
14	9 a. m.	29 6	9 8	2 1	S. W. 2	fair	
	5 p. m.	29 7	10 3	1 8	W. 2	fair	
15	9 a. m.	29 8	9 7	2 2	S. W. 2	fair - -	0,137
	5 p. m.	29 8	10 7	2 0	S. W. 2	fair	
16	9 a. m.	29 8	10 7	2 2	S. W. 2	fair	
	5 p. m.	29 7	11 5	1 9	S. W. 3	cloudy	
							1,334

FEBRUARY 1733.

D.	Hour.	Baro. In.	D.	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain.
											1,334
17	9 a. m.	29	8	9	5	2	0	S. W.	3	Fair	
	5 p. m.	29	7	10	7	2	0	S. W.	3	fair	
18	9 a. m.	29	7	11	0	2	0	S. W.	2	cloudy	
	5 p. m.	29	6	10	8	1	8	S. W.	2	fair	
19	9 a. m.	29	3	10	3	1	9	S. E.	2	cloudy	0,092
	5 p. m.	29	4	9	3	1	9	S. W.	2	cloudy	
20	9 a. m.	29	3	9	3	2	1	S. E.	2	Rain -	0,373
	5 p. m.	29	3	9	5	2	4	S. E.	2	Rain	
21	9 a. m.	29	3	9	5	2	6	S. W.	1	cloudy	
	5 p. m.	29	4	10	2	2	5	S. W.	1	cloudy	
22	9 a. m.	29	4	9	5	2	3	S.	3	fair - -	0,315
	5 p. m.	29	4	10	1	2	0	S. W.	4	cloudy	
23	9 a. m.	29	2	9	6	1	4	S. E.	2	cloudy	0,142
	5 p. m.	29	4	10	2	2	1	S. E.	2	cloudy	
24	9 a. m.	29	6	10	0	2	2	S. E.	1	cloudy	
	5 p. m.	29	7	10	7	1	8	S. W.	1	cloudy	
25	9 a. m.	29	5	9	8	2	0	W.	2	fair - -	0,094
	5 p. m.	29	7	9	4	2	0	W.	3	fair	
26	9 a. m.	29	4	10	3	2	1	S. W.	4	Rain - -	0,110
	5 p. m.	29	4	9	7	1	8	S. W.	2	cloudy	
27	9 a. m.	29	4	9	3	2	0	S. W.	3	Rain	
	5 p. m.	29	4	8	6	2	2	S. W.	2	Snow	
28	9 a. m.	29	6	9	8	2	2	S. W.	2	cloudy	0,065
	5 p. m.	29	5	11	1	2	0	S. W.	2	cloudy	
H. at a med.		29	6	9	9	2	1			Total Depth	2,525
Gr. Height		29	8	11	7	3	0				
L. Height		28	8	8	5	1	4				

MARCH 1733.

D.	Hour.	Baro. In.	D.	Ther. In.	D.	Hyg. I.	D.	Wind. Di.	For.	Weather.	Rain. In.	D.
1	9 a. m.	29	7	11	8	2	4	S. W.	2	cloudy -	0,035	
	5 p. m.	29	5	11	9	2	0	S. W.	4	cloudy		
2	9 a. m.	29	6	10	5	2	1	S. W.	2	cloudy		
	5 p. m.	29	9	10	2	1	7	N.	3	fair - -	0,073	
3	9 a. m.	30	2	9	4	2	2	W.	3	fair		
	5 p. m.	30	2	10	8	1	5	W.	2	fair - -	0,042	
4	9 a. m.	30	2	10	6	2	4	W.	2	fair		
	5 p. m.	30	1	11	0	2	1	W.	2	fair		
5	9 a. m.	29	9	11	0	2	3	N. W.	3	fair		
	5 p. m.	29	9	9	7	1	7	N. W.	2	fair		
6	9 a. m.	29	9	9	8	2	1	N. W.	2	fair - -	0,100	
	5 p. m.	29	8	10	0	1	9	W.	2	fair		
7	9 a. m.	29	3	9	4	2	2	S. W.	3	Rain -	0,072	
	5 p. m.	29	2	10	0	1	6	W.	2	cloudy		
8	9 a. m.	29	2	8	9	2	0	N. W.	3	fair		
	5 p. m.	29	4	9	1	1	7	N. W.	2	cloudy -	0,254	
9	9 a. m.	29	5	8	2	1	5	N. W.	2	fair		
	5 p. m.	29	6	8	1	1	5	N. W.	2	fair -	0,050	
10	9 a. m.	29	7	8	4	1	6	N. W.	2	cloudy		
	6 p. m.	29	7	8	0	2	4	N.	1	Snow		
11	9 a. m.	29	7	7	6	2	3	N.	1	fair		
	6 p. m.	29	6	9	0	2	0	N. E.	1	cloudy -	0,151	
12	9 a. m.	29	7	8	8	2	6	S. E.	2	Rain		
	5 p. m.	29	8	9	7	2	5	S. E.	2	cloudy		
13	9 a. m	30	0	9	1	2	2	E.	2	nazy - -	0,096	
	6 p. m.	29	9	9	0	2	3	E.	2	hazy		
14	9 a. m.	29	8	9	0	2	1	S. E.	1	hazy		
	5 p. m.	29	6	9	7	1	7	S. E.	2	fair		
15	9 a. m.	29	5	8	9	1	8	S. E.	2	hazy - -	0,194	
	5 p. m.	29	4	8	7	1	8	S.	2	cloudy		
16	9 a. m.	29	1	8	5	2	5	S. E.	3	Snow -	0,210	
	5 p. m.	29	1	9	4	2	6	S. E.	3	Rain		
											1,277	

MARCH 1733.

D.	Hour.	Baro. In.	D.	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain.
											1,277
17	9 a. m.	29	2	9	5	2	6	S. E.	1	Hazy	
	5 p. m.	29	2	9	4	2	5	S. E.	2	Rain	
18	9 a. m.	29	3	9	1	2	5	S. E.	3	fair - -	0,292.
	6 p. m.	29	4	8	9	2	6	S. E.	2	cloudy	
19	9 a. m.	29	4	9	2	2	2	N.	1	fair	
	5 p. m.	29	4	8	9	2	0	N. E.	3	hazy	
20	9 a. m.	29	3	7	6	3	8	N. E.	4	Snow	
	5 p. m.	29	3	8	3	4	0	E.	2	cloudy	
21	9 a. m.	29	2	7	9	3	2	S. W.	2	fair - -	0,520
	6 p. m.	29	1	7	4	2	5	S. W.	2	fair	
22	9 a. m.	29	1	8	7	3	0	E.	2	cloudy	
	5 p. m.	29	1	8	5	3	0	N.	2	hazy	
23	9 a. m.	29	4	8	7	3	2	N.	2	cloudy -	0,118
	5 p. m.	29	4	9	5	2	9	S. E.	2	Rain	
24	9 a. m.	29	3	9	6	3	1	S. E.	2	Rain - -	0,070
	5 p. m.	29	2	12	1	2	6	S. E.	2	fair	
25	9 a. m.	29	3	11	3	2	8	S.	1	fair	
	5 p. m.	29	4	12	5	1	8	S.	1	fair - -	0,130
26	9 a. m.	29	4	10	3	3	9	E.	2	Mist	
	5 p. m.	29	3	10	3	3	4	E.	2	Mist - -	0,054
27	9 a. m.	29	4	11	3	3	5	S.	1	fair	
	5 p. m.	29	4	12	4	2	3	S.	1	cloudy	
28	9 a. m.	29	5	12	0	2	5	S. E.	1	cloudy	
	5 p. m.	29	5	12	4	2	2	S. E.	2	cloudy	
29	9 a. m.	29	6	11	0	3	0	E.	2	hazy	
	5 p. m.	29	7	11	4	3	2	E.	2	Rain	
30	9 a. m.	29	9	10	5	2	8	E. b. N.	2	cloudy	
	7 p. m.	29	9	10	2	2	9	E. b. N.	2	fair	
31	9 a. m.	29	9	11	5	2	6	E. b. N.	0	fair -	0,177
H. at a med.		29	6	9	9	2	4			Total Depth	2,638
Gr. Height		30	2	12	5	3	9				
L. Height		29	1	7	4	1	5				

APRIL 1733.

D.	Hour.	Baro. In. D.	Ther. In. D.	Hyg. I. D.	Wind. Dir. For.	Weather.	Rain. In. D.
1	9 a. m.	29 9	11 2	2 9	N. E. 1	Mist	
	5 p. m.	29 9	12 6	2 6	N. E. 0	Mist	
2	9 a. m.	29 9	12 5	2 4	N. 1	cloudy	
	7 p. m.	29 9	12 7	1 7	N. 0	fair	
3	9 a. m.	30 0	12 0	1 8	N. W. 2	fair	
	5 p. m.	30 0	13 0	1 7	N. W. 1	cloudy	
4	9 a. m.	30 1	10 8	2 8	N. 0	Mist	
	7 p. m.	30 1	10 3	2 9	N. 2	Mist	
5	9 a. m.	30 1	12 7	1 8	N. E. 1	Mist	
	7 p. m.	30 1	12 7	1 8	N. 1	fair	
6	8 a. m.	30 1	11 9	1 7	S. W. 1	fair	
	7 p. m.	29 9	13 1	1 5	N. 1	fair	
7	9 a. m.	29 9	11 6	1 8	S. W. 0	fair	
	7 p. m.	29 8	11 8	1 5	S. W. 1	fair	
8	9 a. m.	29 6	12 5	1 6	S. 2	cloudy	
	7 p. m.	29 5	11 9	1 8	S. W. 1	drizling	
9	8 a. m.	29 6	11 9	1 8	W. b. S. 2	fair	
	7 p. m.	29 6	11 8	1 4	W. 2	fair	
10	8 a. m.	29 6	11 6	1 5	S. W. 3	fair	
	7 p. m.	29 6	12 0	1 5	S. W. 1	cloudy	
11	9 a. m.	29 6	11 6	1 6	S. W. 2	fair - -	0,023
	7 p. m.	29 5	11 5	1 6	S. 2	cloudy	
12	9 a. m.	29 5	12 2	1 7	S. 2	cloudy	
	7 p. m.	29 5	11 7	1 7	S. 2	cloudy	
13	9 a. m.	29 4	12 6	1 7	S. E. 1	fair	
	7 p. m.	29 4	11 7	2 1	E. 1	Fog	
14	9 a. m.	29 4	11 8	2 3	S. E. 2	cloudy -	0,055
	7 p. m.	29 6	11 0	1 9	S. E. 2	cloudy	
15	9 a. m.	29 8	11 3	2 0	E. 1	fair	
	7 p. m.	29 9	10 7	2 5	E. 2	cloudy	
16	9 a. m.	30 0	10 8	3 0	N. E. 2	fair	
	7 p. m.	30 0	10 6	2 4	N. E. 2	fair	
							0,078

APRIL 1733.

D.	Hour.	Baro. In.	D.	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain.
											0,078
17	9 a. m.	29	8	10	7	2	9	N. E.	3	Fog - -	0,073
	7 p. m.	29	7	11	0	2	7	N. E.	2	Fog	
18	9 a. m.	29	5	10	7	3	0	N. E.	2	Fog	
	7 p. m.	29	2	10	5	3	7	N. E.	3	Rain	
19	9 a. m.	29	3	11	2	3	4	S.	2	cloudy -	0,187
	7 p. m.	29	5	12	6	2	1	S.	1	fair	
20	9 a. m.	29	7	12	2	2	3	S.	1	Cloudy	
	8 p. m.	29	8	12	4	2	1	W.	1	Rain	
21	9 a. m.	29	9	12	1	2	1	S. W.	1	fair	
	8 p. m.	29	8	11	9	2	0	E.	1	fair	
22	9 a. m.	29	8	11	4	2	0	E.	2	fair	
	5 p. m.	29	8	11	9	2	1	E.	2	cloudy	
23	9 a. m.	29	8	10	7	2	3	N. E.	2	cloudy	
	7 p. m.	29	7	10	6	3	5	N. E.	3	cloudy	
24	9 a. m.	29	7	10	4	2	6	N. E.	3	cloudy	0,262
	4 p. m.	29	8	10	8	2	0	N. E.	2	fair	
25	9 a. m.	29	9	10	5	2	0	N. E.	2	fair	
	5 p. m.	29	9	11	5	1	7	N. E.	2	cloudy	
26	8 a. m.	29	9	10	4	1	8	N. E.	2	fair - -	0,095
	5 p. m.	29	9	11	1	1	6	N. E.	2	fair	
27	9 a. m.	30	0	10	9	1	8	N.	2	fair	
	5 p. m.	29	9	12	6	1	4	N.	1	cloudy	
28	9 a. m.	30	0	10	9	2	0	N. E.	2	cloudy	
	7 p. m.	30	1	11	4	2	0	N. E.	1	cloudy	
29	8 a. m.	30	1	12	4	1	9	N. W.	2	fair	
	5 p. m.	30	1	13	4	1	4	N. W.	2	fair	
30	9 a. m.	30	2	11	7	1	6	E.	1	cloudy -	0,123
	8 p. m.	30	2	11	8	1	5	E.	1	cloudy	
H. at a med.		29	7	11	6	2	0			Total Depth	0,818
Gr. Height		30	2	13	4	3	7				
L. Height		29	2	10	3	1	4				

MAY 1733.

D.	Hour.	Baro. In.	D.	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain. In.	D.
1	9 a. m.	30	1	12	2	1	6	W.	1	cloudy		
	5 p. m.	30	0	13	7	1	4	W.	2	fair		
2	7 a. m.	29	9	12	6	1	6	W.	1	fair		
	6 p. m.	29	8	12	8	1	5	E.	2	cloudy		
3	9 a. m.	29	8	12	1	2	1	E.	2	fair		
	5 p. m.	29	8	10	7	2	3	E.	2	cloudy		
4	8 a. m.	29	9	11	4	1	5	E.	1	fair		
	8 p. m.	29	9	11	1	1	5	E.	1	fair		
5	9 a. m.	30	0	11	2	1	5	E.	1	fair		
	8 p. m.	29	9	12	4	1	4	E.	1	fair		
6	8 a. m.	29	9	11	2	1	6	E. b. N.	2	fair		
	4 p. m.	29	8	13	0	1	4	E. b. N.	2	fair		
7	8 a. m.	29	6	11	6	1	5	S. E.	1	fair		
	5 p. m.	29	6	13	4	1	2	S. E.	2	fair		
8	9 a. m	29	6	10	7	1	4	N. E.	1	cloudy		
	6 p. m	29	6	12	3	1	3	N. E.	2	cloudy		
9	8 a. m.	29	6	11	7	1	4	N. E.	2	fair		
11	9 a. m.	29	7	12	9	1	3	E.	1	fair		
	5 p. m.	29	7	13	4	1	4	E.	1	fair		
12	9 a. m.	29	7	12	3	1	3	E.	1	fair		
	5 p. m.	29	7	13	8	1	2	E.	1	fair		
13	9 a. m.	29	8	12	8	1	4	E.	1	fair		
	6 p. m.	29	9	13	1	1	3	N. E.	1	fair		
14	9 a. m.	29	9	12	7	1	7	N. E.	1	fair		
	6 p. m.	29	9	13	3	1	6	E.	2	fair		
15	9 a. m.	30	0	12	5	1	6	E.	2	fair		
	8 p. m.	30	0	12	9	1	3	E.	1	fair		
16	9 a. m.	30	0	13	2	1	4	S. E.	1	fair		
	8 p. m.	30	0	12	2	1	5	E.	1	fair		

MAY 1733.

D.	Hour.	Baro. In.	D.	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain.
17	9 a. m.	30	0	12	3	1	7	E.	1	Fair	
	6 p. m.	29	9	12	7	1	8	E.	1	fair	
18	9 a. m.	29	9	12	4	2	2	E.	1	Rain	
	6 p. m.	29	9	12	9	1	8	E.	1	cloudy	
19	9 a. m.	29	9	12	6	1	8	E.	1	cloudy	0,032
	6 p. m.	29	8	13	5	1	3	S. W.	0	cloudy	
20	9 a. m.	29	8	13	3	1	6	W.	2	cloudy	
	7 p. m.	29	8	12	8	1	4	W.	2	cloudy	
21	8 a. m.	29	9	13	2	1	5	W.	2	fair	
	7 p. m.	29	9	13	2	1	3	W.	2	cloudy	
22	9 a. m.	29	9	13	2	1	9	W.	1	cloudy	
	7 p. m.	29	9	14	0	1	1	W.	2	fair	
23	9 a. m	30	1	14	0	1	5	N. W.	2	fair	
	8 p. m.	30	1	13	7	1	4	N	2	fair	
24	8 a. m.	30	1	12	5	1	6	E.	2	fair	
	8 p. m.	30	1	12	0	1	7	E.	2	cloudy	
25	9 a. m.	30	0	12	3	1	4	E. b. N.	2	cloudy	0,045
	8 p. m.	29	9	11	6	1	6	E. b. N.	2	cloudy	
26	9 a. m.	29	9	12	0	2	5	N. E.	2	cloudy	
	8 p. m.	30	1	12	2	2	5	N. E.	2	cloudy	
27	9 a. m.	30	1	12	0	3	1	N. E.	2	cloudy	
	7 p. m.	30	2	12	7	2	5	N. E.	2	fair	
28	9 a. m.	30	1	13	8	2	0	N. E.	0	fair	
	7 p. m.	30	0	15	9	1	1	N. E.	0	fair	
29	9 a. m.	29	9	15	3	1	3	N.	1	fair	
	9 p. m.	29	9	13	4	1	6	E.	1	cloudy	
30	9 a. m.	29	8	12	9	1	3	E.	1	fair - -	0,006
	8 p. m.	29	8	12	8	1	3	E.	1	fair	
31	9 a. m.	29	7	14	1	1	3	N. W.	2	fair	
	8 p. m.	29	8	12	2	1	1	N.	2	fair	
H. at a med.		29	8	12	7	1	5			Total Depth	0,083
Gr. Height		30	2	15	9	3	1				
L. Height		29	9	10	7	1	1				

II. *An Account of the* DISEASES *that were moſt frequent laſt Year in* Edinburgh.

THE *Tertian Agues*, which were mentioned in the Cloſe of our preceding Year, continued likewiſe thro' JUNE, and Part of *July* 1732. Towards the End of *June* this Diſeaſe did not form into regular Paroxyſms, and perfect Intermiſſions, but appeared more in the Shape of a remitting Fever. During the Remiſſions, the Pulſe was much ſunk, but as the Sweat came on, the Pulſe became fuller and ſtronger. When the Sweat did not break out, the Patients became delirious, and ſome continued quite deaf for ſome Days. The Urine was pale, and without Sediment 'till the Diſeaſe was going off.

Some were cured of this Diſeaſe after two or three Paroxyſms, by a Vomit or two, but with others the Diſeaſe laſted much longer. Bleeding was not found of Uſe, altho' ſome Symptoms ſeemed to require it, but Vomiting and Bliſtering ſucceeded much better, either of them bringing

ing out the Sweat when untimely ſtopt or prevented.

In JULY ſome few *Tertian Agues* remained; they were then more regular and gentle than before. Towards the End of this Month the *Cholera* began to appear; but it was neither very frequent nor violent.

In AUGUST many among the poorer ſort of People in the Suburbs and Villages near *Edinburgh*, were taken with ſlow Fevers, generally attended with a violent Headach and Ravings; ſome with a *Diarrhœa*, others with Pains of the *Rheumatick* kind all over the Body. As few of the Sick had Acceſs to timely Aſſiſtance, ſeveral died in this Diſtemper.

The ſame Fever continued among the poorer People through SEPTEMBER and OCTOBER, and prov'd mortal the eighth or ninth Day. Beſides the Symptoms before-mentioned, many complained of great Weight of their Heads, and Drowſineſs, Loathing and Vomiting; others had Pains of the Breaſt, and difficult Breathing. Children in this Fever, beſide the Headach and Drowſineſs, had Pain and tenſe ſwelling of the Belly. Moſt of them paſſed Worms, ſome the *Teretes*, others the *Aſcarides*, and recovered.

In

In NOVEMBER ſeveral Children were ſeized with ſlight aguiſh Fits returning every other Day, but laſting only a few Hours, and going off without Sweating. Between the Paroxyſms the Children were pretty eaſy, and their Pulſes calm. Theſe Fits were eaſily carried off by a Vomit or two.

About the ſame Time ſeveral People were taken with a *Cholera*, which did not prove very obſtinate.

In this Month likewiſe the Effects of Cold appeared in different Shapes, as *Coughs*, *Quincys*, *Rheumatick Pains*, *Colick Pains*, *Diarrhæas*, &c.

From the Beginning, till the Middle of DECEMBER, ſlow Fevers were very rife among young People; they continued long, and were attended with Pains in the Breaſt, and a ſymptomatick *Diarrhæa*, but were not deadly. About the ſame Time others were ſeized with Fevers of the nervous kind, with a very frequent but low Pulſe.

On the 17th *December*, ſeveral People were ſuddenly attacked with *Fevers of Cold*; the Numbers increaſed but inſenſibly till the 25th; after which theſe Fevers became greatly epidemick, very few eſcaping them, and continued univerſal in this City

and

and Neighbourhood till the middle of JANUARY 1733, when they began to decreaſe, and diminiſhed daily till the End of that Month.

This Fever began with a Coldneſs, Shivering, Swimming of the Head, Pains of the Head, Breaſt and Back; the Pulſe was very frequent; the Appetite quite loſt, and remained pall'd ſometime after the Diſeaſe was removed. With a great many it began with a running of Lymph at the Eyes and Noſe, which continued for a Day; then they complained of Pain and Swelling about their Throats before the Cough began, and not a few were ſuddenly ſeized with the Cough, which, after the third Day, was inceſſant and conſtant in all, by which they diſcharged great Quantities of *Mucus*, and had their Pains greatly increaſed. Some complained of ſharp Pains in their Bellies, and had a *Diarrhæa*, ſometimes with bloody Stools, eſpecially if they were not ſufficiently blooded in the Beginning. Several paſſed their Urine in very ſmall Quantity, of a high Colour, without Sediment, and continued to do ſo, ſome time after the Fever was gone off. Among the Children, along with the Cough, many had violent Vomitings, and ſome a gentle *Diarrhæa*, which carried off the Diſeaſe.

The

The Fever commonly left the Sick in two or three Days; but after the third Day ſcarce any eſcaped the conſtant tickling Cough. Generally all of them inclined to ſweat, and were thereby conſiderably relieved. Some had profuſe Sweats, with copious reddiſh or brown, but not lateritious Sediment in their Urine, without any previous Coldneſs, Shiverings, *&c.* Theſe ſoon did well, if the Sweating was not diſcouraged by ſome other Evacuation.

Bleeding in the Beginning gave Relief to the Pains, and weakned the Fever, and required to be plentiful to many who had violent Headaches, and a Feeling in their Eyes as if they would have ſtarted out, or to thoſe who had an univerſal Oppreſſion of the *Thorax*, with Stitches and Cramps of the Muſcles employed in Breathing; ſuch in this Condition who delayed Venæſection too long, were ſeized with a *Hæmoptoe*. Some bled a little at the Noſe, and were quickly well, without any Medicine or other Evacuation. A few were at once ſeized with ugly Faintings; when bled they recovered more ſlowly; but when ſupported with Cordials, they were ſoon well.

Veſicatories were of Service to the Cough, and Opiates were of great Uſe, curing ſeveral.

When

When the Phlegm began to thicken, Mixtures in which *Gum Ammoniac* and *Oxymel Scilliticum* were the principal Ingredients, opened the Belly, and did remarkable Service. The ordinary *Pectorals* and *Balſamicks* were not obſerved to do any good.

This Diſeaſe was not of itſelf mortal, but it ſwept away a great Number of poor old and conſumptive People, and of thoſe who were much waſted by other Diſtempers. As a Proof on whom it fell heavieſt, we may remark, That though the Number of Burials in the *Grayfriars Church-yard* (where all the Dead of *Edinburgh* are buried) was double of what it uſes to be in the Month of *January*, yet the Number of thoſe who were buried at the publick Charge was ſo great, that the Fees of the Burials ſcarce did amount to the Sum commonly received in any other Month.

It was very remarkable, That, notwithſtanding this Diſeaſe was ſo univerſal here, the People in our Priſon, and the Boys who are numerous in *Heriot's Hoſpital*, which is contiguous to the Weſt Side of the *Grayfriars Church-yard*, and the Inhabitants of the Houſes near to that Hoſpital eſcaped this Fever and Cough.

This epidemick Diſeaſe which was felt ſooner at *Edinburgh* than any other Part of this

this Iſland, ſpread itſelf gradually over all *Scotland*. It did not reach the moſt Nothern and Weſtern Parts till about fifteen Days after the Time above mentioned of its attacking this City. The Ship *Anne and Agnes*, *David Littlejohn* Maſter, having made a Voyage to *Holland*, with one ſick Sailor on Board, returned with the other ten in perfect good Health, till they made *Flamborough-head*, where on the 15th of *January*, ſix Sailors were taken ill; next Day two more were in the ſame Condition, and the Day thereafter one more fell ſick; ſo that when the Veſſel came to the Road of *Leith*, none on Board were in Health except one, who was ſeized the Day after he came on Shore with the ſame Diſeaſe which his Comrades had, whoſe Symptoms were the common ones of the raging epidemick Diſtemper.

We believe it will not be improper here to mention the Horſes in and about this Place, being univerſally attacked with a running of the Noſe and Coughs, towards the End of *October* and beginning of *November*, before the Appearance of this Fever of Cold among Men.

This epidemick Diſtemper above deſcribed, ſpread itſelf over all *Europe*, and alſo infeſted the Inhabitants of *America*; ſo that

that it was perhaps the moſt univerſal Diſeaſe upon Record. The firſt Accounts we have of any Thing like it this laſt Year in *Europe*, was, in the Middle of *November*, from *Saxony*, *Hanover*, and other neighbouring Countries in *Germany*. It raged at one Time in *Edinburgh*, and *Baſil* in *Switzerland*. It appeared in *London* and *Flanders* after the firſt Week in *January*. Toward the Middle of which it reached *Paris*; and about the End of the ſame Month *Ireland* began to ſuffer. In the Middle of *February*, *Leghorn* was attacked; and near the End of it, the People of *Naples* and *Madrid* were ſeized with it. In *America* it began in *New-England* about the Middle of *October*, and travelled Southward to *Barbadoes*, *Jamaica*, *Peru* and *Mexico*, much at the ſame Rate as it did in *Europe*.

There were alſo ſome People in *Edinburgh* labouring under Fevers of the *Pleuritick* Kind, and others under ſlow tedious ones in the Month of *January*.

In FEBRUARY *Rheumatick* and *Pleuritick* Fevers ſucceeded to the Colds, ſeveral who had paſſed through theſe were ſeized with thoſe and died. The Management of the Sick was no other than what is common in *Pleuriſies*.

About this Time alſo ſeveral People died ſuddenly.

The *Pleuritick* or *Peripneumonick* Fevers which began in *February*, continued through all MARCH.

At the ſame Time ſlow Fevers were likewiſe frequent without any topical Inflammation. In moſt Patients theſe Fevers did not appear with any violent Symptoms, tho' ſome had Ravings, but they were neither conſtant nor high. Theſe Fevers often laſted till the 30th or 40th Day, and in ſome to the 60th; and at length the Patients gradually wreſtled out of them, without any remarkable *Criſis*. The common Remedies in ſuch Caſes availed little here; Bliſtering was found of much more Service than Bleeding.

Tertian Agues, began to appear in *March*, and continued through *April* and Part of *May*, tho' not very frequent; many of them went off eaſily after four or five Fits, without much Aſſiſtance from Medicine, others took the common Courſe.

Some ſhort but ſharp Fevers were frequent in APRIL, with an *Eryſipelas* for the moſt Part on the Face, and ſometimes on the Body or Extremities.

Some few Children had the *Small Pox* all the Spring, and there were rather more

in

in MAY, they were generally of the distinct Kind; and several had an Eruption like the Bastard or *Chicken-Pox*. It was attended with very little Fever, and very slight Symptoms; for after a little Heaviness and Loss of Appetite, the Pustules appeared. They were pretty large and red: They did not suppurate, but had a little Vesicle of clear Lymph on the Top. Some new Pustules appeared for four or five Days successively like the first; and about the ninth Day all went off.

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III. *Extract from the publick Register of Burials in* Edinburgh.

1732.	Men.	Women.	Child.	Still-born.	Sum.
June - -	23	32	27	0	82
July - -	16	21	37	5	79
August - -	19	20	39	2	80
September	15	32	20	4	71
October -	20	19	32	4	75
November	24	28	33	4	89
December	31	41	34	3	109
1733.					
January	56	81	74	3	214
February	40	44	48	3	135
March -	36	42	34	5	117
April - -	20	28	41	2	91
May - -	19	26	57	3	105
Total	319	414	476	38	1247

IV. *An Eſſay on penetrating topick Medicines; by* JOHN ARMSTRONG *M. D. Phyſician at* London.

IT does not ſeem ſtrange that Medicines ſhould, according to their various Powers, affect the Solids and Fluids to which they are immediately applied. Neither is it hard to conceive by what Means ſuch Particles as are capable to enter the abſorbent Veſſels, ſhould reach any Part of the human Body that lies (as all its Parts in a ſound State do) in the Road of the Circulation. But by what ſecret Ways external Medicines are immediately communicated to the remoter Subſtance of the Parts to which they are applied, and how by that Means they contribute to remove Diſeaſes that have for their Seats the Ligaments of the Bones, or ſuch other Parts as ſeem not to be acceſſible from without, is an Enquiry that ſeems to have been hitherto pretty much neglected. 'Tis a very common Way of talking upon this Subject, That this or that Medicine penetrates the Pores; but I am not ſo certain that the Ideas commonly joined to ſuch Expreſſions are very diſtinct:

diſtinct: For no Writer of my Acquaintance that has handled this Subject, has taken the Pains to explain himſelf ſo far as to tell us what Pores he means, which has induced me to venture the laying before you a few Conjectures concerning the Ways by which topical Medicines are conveyed into the Subſtance of the Parts to which they are applied, directing my principal Aim to the Conſideration of thoſe that tend to the reſolving of Obſtructions of the remoter Veſſels.

I need not here enter into any Diſquiſition concerning the Nature and Seat of Obſtructions, nor from thence explain the Indications of relaxing the obſtructed ſmall Arteries, and of attenuating the obſtructing Matter: This is what may be learned in ſeveral Books, and is moſt methodically treated in that elegant Chapter of *Boerhaave*'s *Aphoriſms de Obſtruct.* Allow me only to mention, That the Medicines of which I now treat are ſuch, as by the Smallneſs and Mobility of their Particles, attended for the moſt Part with a gentle Acrimony, are able to make their Way into the Subſtance of the Parts to which they are applied, without eroding or wounding any of the Solids, and thence are juſtly enough named *penetrating Topicks.*

That the Effects of ſuch Medicines are not owing to the Particles of them, which enter into the Orifices of the abſorbent Veins that are every where on the Surface of the Body, ſeems to me plain from their not being applied, on this Suppoſition, to the obſtructing Matter, till they have been mixed with all the Maſs of Blood; and therefore an exceeding ſmall Proportion of them can ever arrive at the obſtructed Arteries; beſides, if this was the Caſe, theſe Medicines would have as great, if not greater Effects when applied to the ſound Parts of the Body, than to the diſeaſed Part, which daily Experience ſhews they have not.

I can as little allow all the Effect of theſe Medicines to depend on their opening the Orifices of the exhalant Veſſels on the Surface of the Body, which ſome might ſuppoſe always obſtructed when the more internal ones are blocked up; and therefore would alledge that the Fluids having regained their Paſſage by the exterior Veſſels, will exert a leſs *Momentum* on the Interior, the Obſtruction of which comes conſequently to be reſolved, I cannot, I ſay, allow this Account to be juſt, becauſe by other Medicines, the Emollients for Inſtance, the Obſtruction of the exterior Veſſels can be equally well removed; but theſe have not

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the Power of reſolving deep-ſeated Obſtructions, which they would have equally with the Claſs of Medicines of which I treat, if the above Reaſoning was juſt.

Nor can I imagine the ſubtile Particles of the *penetrating Topicks* capable of forcing their Way through the Coats of numerous Veſſels, where we can ſcarce ſuppoſe Pores by which they ſhould paſs, without Hazard of the finer Particles of our Fluids eſcaping out at the ſame Paſſages by which the Medicines entred, which would produce a great Train of bad Conſequences.

Previous to my Opinion of this Matter, it will be neceſſary to obſerve, That tho' the ſmall Arteries of the Body cannot admit any thing at their ſmall Extremities to paſs backwards towards their larger Trunks, as long as the Force of Circulation continues to propel the Liquors towards their Extremities; yet when that propelling Force does not act, they will, like other empty Tubes, admit Subſtances at either Extremity; and wherever they are ſmall enough, they will exert the ſame Power of raiſing Liquors in them, as other capillary Tubes do. Beſides, what Reaſon dictates to us in Proof of this, we have it finely illuſtrated and confirmed by Mr. *Hales*'s Experiments of the Motion of the Sap or Juices imbi-

bed at either Extremity of Vegetables.

I imagine therefore, that ſubtile Medicines are conveyed by the exhalant Veſſels of the Skin, to thoſe Parts of the ſmaller Arteries, where the Circulation is choaked by Obſtruction, which I conceive to be thus accompliſhed. The Places where the arterious Veſſels are moſt liable to be obſtructed, are where they are ſtraiteſt; that is, where they are about to join their analogous Veins; and the ſmaller any Branch of any Artery is, the more ſubject it is, *cæteris paribus*, to Obſtruction. It does not ſeem improbable then, that the Branches of Arteries, diſtributed to the more ſolid Parts, immediately before they deliver their Contents to their correſponding Veins, ſend off an exhalant Veſſel to the Skin, by which a Separation is made of the moſt acrid exalted Parts of their Fluids, which hitherto may have been uſeful by their inciding Acrimony, to promote a free Paſſage through theſe dangerous Straits; but, by acquiring ſtill a greater Sharpneſs, would be noxious in another Circulation. This I preſume is agreeable enough to the moſt approved Theory of Obſtruction, Secretion and Perſpiration. Now, ſuppoſe an Obſtruction formed in ſuch a ſmall Artery, above the Place where it detaches its exhalant Branch;

here

here is a Stop put to the Progreſs of the Fluids through this Veſſel, its perſpiratory Duct becomes empty; and for this Time it is as pervious from without, as an abſorbent Vein: Thus it may admit, as far as the obſtructed Point, the ſmaller Particles of Applications, whether ſuch as are properly called penetrating or emollient, by whoſe attenuating, ſtimulating, and relaxing Powers, the obſtructed Matter is at laſt reſolved and looſened, and the dam'd-up Fluids following with a great Guſh, partly return by the Vein, and partly make their Exit by the Excretory Tube. Thus when a great Number of ſmall Arteries, neighbouring one another, are obſtructed and wedged cloſe together, as ſoon as a few of them are, by the Means above-mentioned, unlocked, the reſt will crowd each other leſs, and will be more at Liberty to yield to the Force of the urgent Stream: So that by this increaſed Laxity, and the continued and repeated Application of the ſame reſolving Powers, the whole Bulk of obſtructed Veſſels is by Degrees opened.

After the ſame Manner, when ſome of the larger Kinds of Arteries are obſtructed, the more ſubtile Particles of external Medicines may be conceived to gain Acceſs, by a great Number of Conduits, to the Places where

the Obſtruction is formed, if betwixt theſe Points and the Riſe of the exhalant Veſſels, they have no Anaſtomoſes with other Branches. And perhaps theſe mutual Communications are not ſo frequent in the capillary Veſſels as ſome give out. This is confirmed by Mr. *Hales Hæmaſt. Exper.* IX.

This Doctrine may perhaps receive ſome Illuſtration from ſome *Phænomena* that ordinarily attend ſeveral topical Diſeaſes, particularly the Gout, whoſe *cauſa proxima* is, according to the moſt plauſible Accounts, an Obſtruction of the ſmall arterious Veſſels diſtributed to the Ligaments of the Bones, the Tendons and their Ligaments. 'Tis well known, that, all the Time this Diſeaſe exerts its Rage, the Skin of the Parts affected is remarkably dry, which no doubt is owing to the diminiſhed Perſpiration; and this Dryneſs happens when the Pain is not attended with any Tumor, and therefore cannot be imputed to any Compreſſion made upon the perſpiratory Ducts. But as ſoon as the broken *Lentor* begins to thaw from ſome of the Veſſels, the Skin of the Part is ſeized with a keen itching, from the morbid Matter, grown acrid by a long Stagnation and Attrition, ruſhing through the Veſſels of Perſpiration contracted to their leaſt Capacity, till at laſt this ſame Matter,

Matter, together with that ſharp thin Fluid which naturally is diſcharged this Way, pouring into theſe Veſſels in greater Quantities, dilates them more and more, and drills out in Form of Sweat, while the cuticular Scales dried and ſhrunk for having been ſo long deprived of Moiſture, fall off in great Abundance.

But beſides this, there is perhaps ſtill another Way by which external Medicines are conveyed to the more diſtant Veſſels; that is, by inſinuating themſelves between the Interſtices of the Canals. And though in this Way they cannot, according to our Hypotheſis, act immediately on the ſtagnant Fluids, except ſuch as are extravaſated, yet they may be conceived as effectually to ſtimulate or relax the obſtructed Veſſels, as thoſe that enter their Cavities.

Though I ſaid before, (and gave a Reaſon for ſaying) that it did not ſeem very probable that the Particles of Medicines, however ſubtile, could penetrate through the Coats of the Blood-veſſels into their Cavities; yet it is not, as I apprehend, inconſiſtent with this Opinion, to allow their finding a Paſſage through that rarer Texture of ſmall Veſſels, which fills up the Interſtices of the larger ones, and connects them looſely together: For it does not appear that theſe

Tubes,

Tubes, which do not conſpire to the forming of a larger Veſſel, are ſo cloſely twiſted together, as the *Vaſa vaſorum* or thoſe that do: And that the Subſtance of our Bodies is really pervious enough to tranſmit the more ſubtile Particles of Fluids that are applied to them, appears *ad oculum* in the human Body, ſince that Part of the Inteſtines upon which the *Veſica Bilaria* lies, is always found tinged with Bile filtred through the Coats of that tenacious Membrane.

I know not how elſe the whole Subſtance of a rigid contracted Part, comes to be ſoftned and relaxed by emollient Steams, Fomentations or Cataplaſms; or, by what other Way of Communication, we can account for the Effects of ſome Medicines, that, externally applied to the Abdomen, prove emetick, cathartick, antemetick, anthelmintick, *&c.* as well as when taken inwardly, or for the Succeſs of proper Fomentations, *&c.* applied to the Loins in ſome Diſeaſes of the Kidneys; or of reſolvent Applications in diſcuſſing occult Tumors of the Glands.

Medicines, whether Reſolvents or Palliatives of the ſtupifying anodyne Kind, may perhaps reach the obſtructed Veſſels of the more ſolid Parts, by both the propoſed Ways. Though conſidering in what libe-

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ral Quantities Anodynes are uſed externally, and how ſmall a Doſe is ſufficient to mitigate Pain, or even to cauſe Sleep, when inwardly taken, the abſorbent Veſſels may take up as much of theſe as is ſufficient to anſwer for their Effects.

V. *REMARKS on the external Uſe of* Tobacco *and* Groundſel, *and on the Effects of Oil of* Turpentine *given internally; by Mr.* JOHN STEDMAN *Surgeon at* Kinroſs.

YOUR Propoſals inviting People to communicate any uncommon Effects of Medicines which they have obſerved, I preſume to lay before you what I have ſeen performed by two very common Drugs, that is not generally remarked by the Writers on the *Materia Medica*: To which I ſhall ſubjoin a Caution neceſſary in the Uſe of another Medicine.

Tobacco beat well with Vinegar or Brandy into a Maſh, and applied in a Linen Rag on the Stomach, occaſions ſtrong vomiting, and has ſometimes very good Effects in removing hard Tumors of the *Hypochondria*; I know two Inſtances of its making

a compleat Cure: One is, of an old Man, who, by ſleeping in the open Air while the *Serenadas* or Night-dews fell, was taken in the *Weſt Indies* with a Numneſs of his whole Body, which ſoon was followed with purging and vomiting; and theſe going off, he had all the Symptoms of Jaundice, with Hardneſs and Pain under the ſhort Ribs of the left Side: The Pain went off in a few Days, but the Tumor increaſed. After he had uſed Variety of Medicines for five Years to remove this Diſeaſe, a Sea-Surgeon applied a Pultice of *Tobacco* diſguiſed with Green Tea, Sugar and Cochineal, upon the *Epigaſtrium* and *Hypochondria*; after this Application had been made four or five Hours, he vomited a great deal of purulent Matter: When the Pultice was taken away, the Vomiting ceaſed. He continued to apply this Maſh once a Day for a Month, and was perfectly cured. The other Example is of a Boy, fourteen Years old, who was cured much in the ſame Manner of a hard indolent Tumor of the left *Hypochonder*.

The Man had ſix Ounces of *Tobacco* in his Pultice, the Boy had only one; and the Quantity muſt always be regulated by the Age of the Patient.

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I had been informed of a young Man at *Edinburgh*, who was famous among the lower ſort of People for curing Agues with an external Application; and I had ſeveral well-vouched Stories of his Succeſs: This made me curious to diſcover what his Secret was. I therefore procured ſome of the Pultice which he applied to the Pits of the Patients Stomachs; it proved no other than recent *Erigerum* or *Groundſel* beat down into a very coarſe Pulp, with ſome other Herbs which I believed were put in only to conceal it; for ſince I came here, I have uſed the *Groundſel* alone with very good Succeſs. It is applied cold, and cauſes ſtrong vomiting ſome Hours after it is applied, which is only done on the Days free from the Paroxyſm.

Ætherial Oil of Turpentine is frequently taken in Honey, or mixed with ſome Liquor, by People labouring under the Sciatick and Rheumatick Pains; and the Patients ſometimes are very careleſs in meaſuring out their Doſe, which ought to be ſmall at firſt, and to be very gradually increaſed, for Fear of the bad Conſequences which happened to the two following Women.

One

One, ſixty one Years of Age, whoſe Doſe I cannot determine, was ſeized with a Pain in the Kidney and *Diabetes*, and died hydropical in twenty five Days.

The other got two Drachms of the Oil in warm Ale, from a Smith, which ſoon brought on a Strangury, bloody Urine, and its total Suppreſſion, with Fever, violent Thirſt and Vomiting; ſo that I really deſpaired of being able to recover her: But ſhe was happily cured by the warm Bath, and drinking plentifully of Dr. *Fuller*'s *Emulſio Arabica*.

VI. *An Enquiry into the natural Hiſtory and medical Uſes of ſeveral mineral* Steel Waters; *by Dr.* Alexr. Thomson *Phyſician at* Montroſe.

Steel Spaws are every where ſo frequent in this Part of *Scotland* where I live, that to imagine them impregnated with Iron in Subſtance, were to conceive the whole Country in one Mine, for, Exceſs and Defect computed, there may be reckoned at leaſt one for every Pariſh.

The Soils out of which theſe mineral Springs riſe are various: That near to *Aberbrothock*

berbrothock is in the ordinary poorer ſort of the Soil of this Country, the upper *Stratum* being a gravelly Clay, below which there is another of Pebble Stones intermixed with Sand; under this there is Sand and Gravel mixed. The Well is in the lower Part of a Den or hollow Ground, having a Rivulet running by at the Diſtance of about fifty or ſixty Paces. The Side of the Rivulet oppoſite to the Well is bounded by a gravelly Rock, betwixt the Layers whereof there ouzes clear Water dropping over Sleeks (*a*) ſuſpended thereat; and at the Top of the Rock there is a ſmall Well of good Fountain Water. I evaporated the Water from theſe Sleeks by the Heat of the Sun, and nothing remained but a grey Powder, as of ordinary Clay. About three or four hundred Paces above the Well, and on the ſame Side of the Rivulet, there is another Spring of common Water; but there are no more Rocks near or above the Well for a conſiderable Way. The Soil of moſt other Spaws which I have examined is much the ſame with that of *Aberbrothock*, and generally a Rivulet runs alſo near them through common Flintſtone and Sand; particularly, this is the Caſe of the Well of

(*a*) A ſmooth ſhining Clay.

Kincardine, which is esteemed in this Country next to *Aberbrothock*: And I am informed by good Hands, that the Soil of the Mineral Well at *Peterhead*, at the Mouth of the *Murray-Frith*, is much the same, without any Rocks in its Neighbourhood, except the Sea Rocks, to which it is so near, that it is overflowed by high Tides.

There are only three *Spaws* that I know hereabouts, the Soil whereof varies from what I have just now described; one of these is in *Glendy*, beyond the fam'd *Kairn*, on the Top of the *Grampions*: The Soil of this Well is Bog, with Moss-ground round it; and no Rock is to be seen near it. This Spring bubbles up between the Moss and the Gravel at its Bottom, playing, as it issues out, like a Pot boiling, and appears of the Colour of *Oker*, with which one's Shoes also are coloured when he treads on the Mols near the Well. I have seen another situated in a like Soil in *Lentretham*, near to the Mouth of *Glenisla*; but it does not bubble up as the former does.

The only *Spaw* of my Acquaintance, that hath any thing of Rock uncommon in its Neighbourhood, is near to *Cortachie*, my Lord *Airly*'s Seat on the Water of *South-*

South-Esk: This mineral Fountain is ſituated at the Foot of a Hill near to the River, having, at the Diſtance of forty or fifty Paces, a good many rocky Stones, which ſhine or ſparkle like *Marcaſites* when they are broken; and Pearls are fiſhed in the neighbouring River. I have ſent ſome of theſe Stones for your Examination; but they are not ſo bright or ſhining, and of ſuch a poliſhed Surface, as others which I have ſeen on the other Side of that Ridge of the *Grampions* in *Gleniſla*.

After conſidering the Soils from which theſe *Steel Spaws* riſe, and all in their Neighbourhood, I would think that the moſt probable Account which can be made of their mineral Origins may be taken from the Diſcoveries of Mr. *Geoffroy*, and of Mr. *Lemery* the Son, compared (*a*). *Geoffroy*, after attempting to make Iron with the Clay of Brick and Linſeed-oil, found, by ſome ſuch Experiments, that there was Iron in all Vegetables which he could put under Trial; for all of them had Particles, which the Loadſtone, or Needle touched with it, attracted. And Mr. *Lemery*, by expoſing Vegetables to the Burning-glaſs, fus'd them into a metallick Maſs, in the

(*a*) Memoires de l'Acad. des Sciences, 1704, 1705, 1706.

ſame manner as was done to Filings of Iron; and from hence takes Occaſion ingeniouſly to account for this Mineral's aſcending, its Gravity notwithſtanding, through the whole *Compages* of Vegetables: Which he illuſtrated and confirmed ſtill further, by his Experiment on Iron diſſolved, firſt by Spirit of Nitre, and then by Oil of Tartar, when it *arbored* all over the Surface of the Veſſel in a great Variety of Branches. What I aim at may ſtill be more eaſily conceived from what *Le Givre*, a Man of good Senſe and Learning of his Time, writes concerning the medical Wells of *Provence*, to wit, That in Trenches digged for diſcovering the Origins of theſe Wells, and on the Sides of the neighbouring Ditches, he found the mineral Fluid drilling through its ſmall Conduits, and becoming of the Conſiſtence of the Dreg of Oil: And then he tells us the various Colours it aſſumes in Analogy to *Crocus Martis*, and deſcribes its different Degrees of Conſiſtence and Solidity, according to its being more or leſs expoſed to the Air. It is probable that the like Diſcoveries in ſeveral other Parts of *France* induced *Lemery* to ſay, that *France* abounds in Iron every where; for I believe we have not otherwiſe heard of Mines of Iron being eve-

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ry where in that Country. So that our medical Wells may bear a juſt Analogy to their mineral Progeny of Vegetables, if ſuch new Phraſe of Language may be allowed; and I think the Volatility of our *Spaws*, diſcovered both by the Experiments made with them, and by their medical Effects, of which hereafter, may hence be beſt accounted for. Nor needs what I have here argued for be thought ſurpriſing, ſince the beſt Philoſophy hath proved the primogenial Earth, compared with it as at preſent, to have been of a more liquid Conſiſtence. And Mr. *Boyle* and Monſ. *Tournefort* have diſcovered the ſame of Gems, Marbles and Corals.

Whatever Truth is in this Doctrine, Mr. *Geoffroy* and *Lemery*'s Experiments lead us to underſtand why *Steel Spaws* are ſo frequent; and really conſidering how much the Mineral is diffuſed over all, one would think that all Waters ſhould be impregnated with it; and poſſibly they may be ſo, only the Proportion of the Mineral is ſo ſmall in moſt Fountains, that the common Trials will not diſcover it.

I could find no Difference in the ſpecifick Gravity of the *Steel Waters* I tried from that of common Fountain Water.

The fixed mineral Contents of the Steel

Waters of *Aberbrothock* and *Peterhead* may be collected much more easily than is done in the common Method of evaporating the whole Water, if the mineral Water is put in open Bottles some Days; for then its Contents precipitate, and the Water being poured off, will let fall any Remains of the Mineral, by affusing common Fountain Water: And the Precipitations may be hastned, by mixing any proper Adstringent. The mineral Substances thus collected, are afterwards to be dried in the Shade, Sun, or analogous Heat of *Fire*. In this manner they will be got more intire, than when such a strong Heat is employed as is necessary in boiling, which may force off the most volatile Substances.

After four *Scottish* Pints of *Aberbrothock* Water were evaporated leisurely at the Well, there was no Appearance of a Pellicule, and the dried Powder that remained, weighed, as near as an Accident of losing a little of it would allow me to judge, between fifteen and twenty Grains; this I threw into a hot Iron Ladle, when it sparkled into little *Flammules*, just as the fine Filings of Iron use to do: But the Powder of the Sleeks of the Well sparkled but faintly when so tried.

Monsr. *du Clo*'s Experiments satisfy me,

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as they did him, that it is not eaſy to determine what Salts theſe Waters contain, or whether all are impregnated with the ſame kinds of Salts: He could find neither *Allum* nor *Vitriol* in any of the *French* Wells; only in one he found ſome Reſemblance of the latter: All the other Wells gave a Salt, anſwering to a Compoſition of *Nitre* and *Sea Salt* mixed in various Proportions; which probably is the natural Salt of the Earth diſcovered by Mr. *Tournefort* (*a*), reſembling in moſt Trials the *Natrum* of the *Levant*, being neither acid nor alcali, but approaching moſt to the latter.

The *Gall*, *Myrobalan* and *Granat* Bark were chiefly uſed by *du Clos*, to diſcover the *Steel Spaws* of *France*, and to determine the greater or leſſer Degrees of the mineral Contents, by the higher or lower Tincture which they made when mixed with the mineral *Steel Waters*: Which Trials have alſo anſwered very well with me; only, ſeeing the *Myrobalans* give a reddiſh Tincture to ordinary Water, and obſerving the mineral Waters going upon the ſame Colour when I uſed them, I have choſe to make my Trials with the *Gall*,

(*a*) Preface to his Hiſtory of Plants in the Neighbourhood of *Paris*.

and employed either the Shell intire, or its Tincture, becauſe the Powder or its Infuſion generally makes the Water muddy. Having therefore affuſed the ſame Quantity of *Peterhead* and *Aberbrothock* Waters on like Quantities of *Gall*, the *Peterhead* Water ſtruck a deep purple Colour, and the *Aberbrothock* Water became only dilutely red, as a *Vin paillè*; then I added by Degrees double the Quantity of common Fountain Water to the *Peterhead* Water tinctured with the *Gall*, before it became preciſely like to the Colour of the *Aberbrothock* Water with the Gall in it: Whereby we may ſee that the mineral, as reached by the *Gall*, is two Thirds ſtronger in the *Peterhead* than in the *Aberbrothock* Water. The Water of *Glendy* came neareſt to the *Peterhead* Well in its deep Tincture; next to this was the Water of *Kincardine*: Moſt of the other Spaws that I have examined give a Tincture much like that of *Aberbrothock*; ſome, a little higher; others, ſomewhat lower.

The Infuſion of the Sleeks gathered from the Stones wherewith the Well of *Aberbrothock* is encompaſſed on the Sides, and covered above, made with Water or Vinegar, ſtruck a ſtrong-coloured Tincture when Galls were mixed with it.

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Rectified Spirit of Wine makes no Change on the *Steel Waters*; but when the Gall is afterwards added, the Tincture is higher than when no Spirit is used. The common Spirit of Wine mixed with the mineral Water, turns it of a fine light Violet Colour; and when the Gall is added, the Tincture becomes more dusky than by the Gall alone: Whether is it not probable, that the rectified Spirit exalts the Sulphur, or other active Principles partaking of the Nature of Sulphur, without making any Tincture, but only augmenting that given by the Gall? whereas the common Spirit gives a Tincture, which, being confounded with that of the Gall, forms that dusky Colour.

Our *Steel Spaws* which I have tried, appear to be so very volatile, that by the least Access of Air after they are taken up from the Well, all that bears Trial in them goes off, especially if they are taken up in a hot Sun; you will better comprehend this, when I tell you, that lately I caused two Bottles of *Aberbrothock* Water to be taken up in my Sight, and to be immediately well cork'd and rosin'd: Next Day, the first of them I put under Trial answered scarce more than ordinary Fountain Water; but the other answered in the ordinary Manner. The only Reason I could find

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for this was, the cracking of the Roſin, and Roughneſs of the Neck of the Bottle, which hindred the Cork to apply ſo cloſe to the Bottle in which the firſt Water was contained: This taught me to believe I had not been formerly abuſed, as I ſuſpected, when I found this and ſome other Waters brought me to have a ſenſibly vapid Taſte, and to contain nothing of the Mineral; though I muſt tell you, that when I formerly had *Aberbrothock* Water under Examination, and did not uſe ſo much Precaution as lately, I did not meet with ſuch Diſappointments; which I can attribute to nothing but the Difference of the Seaſons, the Water being taken up for my late Trials in very hot Weather.

As I found the *Liege* and *Piermont Spaws* giving the ſame Tincture with Galls, and agreeing every other Way, the vinous Flavour peculiar to theſe foreign Waters only diſtinguiſhing them, ſo I have ſeen theſe alſo faint of Taſte, and refuſing the uſual Trials, on occaſion of being ill cork'd or roſin'd.

I come now to conſider the medical Uſes of theſe Springs. As they evacuate moſtly by Urine, but rarely by Stool, and only in the more lax and flabby Texture of the Bowels, I have found them, eſpecially

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that of *Aberbrothock*, good in nephritick Diſeaſes, ſcouring off Gravel, and ſometimes puſhing a Stone down. They are beneficial in ſcorbutick Foulneſſes, eſpecially when the Humours are in an aceſcent Diſpoſition; in all Diſeaſes of the Stomach depending on an Acid; and in general, they are ſerviceable, and may be uſed more freely in all Indiſpoſitions, occaſioned by what Phyſicians call a morbid Acid in the Body; but where the alcaline or bilious Diſpoſition prevails, they are to be more ſparingly, if at all, taken. And as Obſervation hath evicted the Diſtinction of ſuch oppoſite Cauſes of Diſeaſes, ſo the Trial by Galls, their turning Syrup of Violets, Tincture of Roſes, *&c.* green, diſcover the Alcali in them; which might have undeceived Men from being ſo fond of denominating them ſo generally *Acidulæ*.

My Experience in the Cure of Diſeaſes by theſe Waters, will not allow me to ſtate univerſally their comparative Vertues on the higher or lower Degree of Tincture from the Mixture of other Subſtances with them; for I cannot ſay whether the deeper Colour of *Peterhead* Water with Galls, depends on a greater Quantity of the ſame mineral Sulphur, or on a firmer Combination

tion with its Earth; or whether they may not contain a groſſer Sulphur, or a larger Proportion of Earth than is in *Aberbrothock* Waters. All I can hitherto determine by Obſervation is, That in Flaccidneſs, and too great Relaxation of the Solids, eſpecially of the Stomach and other chylopoietick Organs, the *Peterhead* Water has by far the Preeminence: As on the other Hand I have found the Uſe of the *Aberbrothock* Water of ſingular Advantage, in Lowneſs of Spirits and other Maladies, where the Nerves are ſaid to be affected; for which I have alſo ſeen the *Kincardine* Water beneficial.

One of our Burghers, about thirty Years of Age, of a clean and healthy Conſtitution, having met with ſtormy Weather at Sea, fed on ſalt Meat, and having bad Succeſs otherwiſe in a Voyage, returned ſcorbutick, emaciated, enervated in all the digeſtive Powers, low ſpirited, and ſo extremely feeble, that he could walk or ſit on Horſeback with Difficulty: After drinking *Aberbrothock* Water at the Fountain a few Days, he walked about with Eaſe, and with much more Vigour.

A Gentleman of Honour, aged ſixty, of a vigorous Body, and who had enjoyed good Health, impair'd at Times by good

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Fellowſhip, from an Inability to walk without Support, recovered Ability to walk with Eaſe by the ſame Means in a few Days: And he received the ſame Benefit in a greater or leſſer Degree for ſeveral Years, in which he uſed that mineral Water.

A Lady in a declining Age, having had Uneaſineſs in her Mind, and becoming otherwiſe of infirm Health, every accidental Diſorder was accompanied with a notable ſinking of Spirits. After various Medicines that ſeemed at Times to gain on the Diſtemper, which always however returned rather worſe, and the Lowneſs of Spirits ſtill attacking her leſs or more, ſhe drank the *Aberbrothock* Water at her own Houſe in the Spring: The Water was always taken up at Night, and kept freſh two or three Days, and then was renewed. She continued the Uſe of it a Month, with ſome little Intervals, and thereby recovered both Health and Spirits.

A Gentleman having ſuffered an aguiſh Indiſpoſition ſeveral Years, it ſhifted at laſt into low Spirits to a great Degree; which he recovered in good Meaſure, by taking to a low Diet. When his Symptoms return, as they often do, the *Liege* and *Piermont Spaws* and *Aberbrothock* Water in its Seaſon are of good Uſe to him; frequently

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he prefers the laſt to the others, though it is brought farther and longer kept than in the former Caſe.

I have mentioned theſe two Caſes to ſhew, that notwithſtanding the Virtue of the Water is ſo liable to fly off, yet it proves of good Effect at a Diſtance from the Fountain; and it may prove better this Way, if taken up at a right Time, than when it is drank at the Well in a hot Seaſon, after the Spring hath been expoſed ſeveral Hours to the Morning Sun.

The beſt Seaſon of drinking theſe Waters is doubtleſs in *April* and *May*, after the Spring Rains have fallen, and before the Heat of Summer comes on; and in the Month of *Auguſt*, to the Middle of *September*, before the Autumn Rains begin; at both which Seaſons they generally taſte moſt of the Mineral: And it is commonly obſerved, that in the hotteſt Weather theſe Waters taſte moſt faint, except after a moderate Shower of Rain, when the Taſte turns ſtronger, but it is weakened after great Rains. The Badneſs of the Quarters, and the Pleaſure and Convenience of walking about in open Air, have however determined the Seaſon of Uſe to the two intermediate Summer Months: But I enjoin the People who ask my Advice, to drink this

this Water rather at home in the proper Seaſon, and to put the cold Air off it at a Fire, if it proves cold to the Stomach.

Great Numbers drink the Waters of *Aberbrothock*, without obſerving any Regimen, or having any Directions from a Phyſician; nor do I enjoin any conſiderable Preparation of Body to my Patients, except in very remarkable Foulneſs of the Juices. Nor do I allow them to take Phyſick for purging, during the Uſe of the Water, if they are not to bath in them. The Medicine I ordinarily give is *Cryſtals of Tartar*, to promote the Evacuation in the moſt ordinary natural Way. With this I ſometimes give ſtewed Prunes, or ſuch like, to ſtir a ſluggiſh Belly a little.

The vulgar Opinion of all the Benefit of this Water being proportioned to the Quantity drunk, prevails ſo much here, without any Regard to the Conſtitution, and Strength of the Patient, or Nature of the Diſeaſe; and ſo many remarkable Accidents have happened by drinking too much, that there is juſt Reaſon to doubt, whether the Abuſe of theſe Waters does not more Harm than the right Uſe does Good. My general Rule is not to exceed three *Engliſh* Pints drunk leiſurely, eſpecially till the Evacuation by Urine begins, chewing Cinnamon,

namon, Carvie, or any other eaſy Aromatick as the Stomach requires during the drinking; and walking in the Intervals of their Drinking and after they have finiſhed their Day's Doſe, till they begin to be ſenſible of Fatigue.

This Rule concerning the Quantity to be drunk, and Exerciſe while drinking, I have found to require one Caution, and one Exception. The Caution is taken from the Indications in View. When the Springs of the fibrous Syſtem are to be ſcrewed up by the Force of the Mineral, its greater Quantity and ſtronger Conſiſtence with leſs of the diluent Element are neceſſary; and therefore the Waters which give the higheſt Tincture upon Trial, and theſe drunk in ſmaller Quantities are preferable: And this makes me regret that there are no tolerable Quarters nor Fields for walking near the *Glendy-well*, which is of the higheſt mineral Tincture, next to that of *Peterhead*. I have cauſed it to be brought ſometimes to People's Houſes, where it did Good; but I have never ſeen the Uſe of it long enough protracted to make any Obſervation of Conſequence thereon. If our Deſign principally is to waſh the Inwards, the weaker Kinds of the mineral Waters are moſt proper.

The

The Exception to Exerciſe is chiefly in the Caſe of great Relaxation of the Stomach and digeſtive Powers, which makes the Patients liable to throw up their Food, as moſt frequently happens to Females, I order ſuch to feed a-Bed, and to ly cloſe till the firſt Digeſtion is accompliſhed; and this ſerves to good Purpoſe preventing the Stomach's caſting up its Contents. A Gentlewoman ſuppoſed quite loſt in this Diſeaſe, her inward Powers being altogether enervated with a miſerable Scene of ſucceeding Symptoms during ſeveral Years, was at laſt carried from this Place to *Peterhead*, where ſhe drank all the Water a-Bed, laying herſelf to ſleep after each Draught; by which Means ſhe retained all: And though ſhe got into drinking the Water to the Exceſs of a *Scottiſh* Pint a Day, yet ſhe returned perfectly recovered, and remains ſo theſe ſeveral Years.

The *Aberbrothock* Water has got the Preference to the reſt in this Country, moſt Cures having been made by it. Whether this is owing to its Vogue, having occaſioned a greater Number of Patients to repair to it; or whether it depends on its intrinſick comparative Vertue from the *Sulphur*, which I begin to diſcover more conſpicuous in it than in the others, I ſhall

not determine; but in all ordinary Caſes I recommend the neareſt *Spaw*, and have frequently ſeen the Effect anſwer, eſpecially by *Kincardine* Well, and that on our River of *Esk*, in the Skirts of the *Grampians*; the former however comes nearer to *Aberbrothock* Water in the Cure of nervous Diſeaſes. A Girl in bad Caſe of the Nerves, as Nature was framing her into the Condition of her Sex; and her Brother, a Boy of ten Years of Age, enervated to almoſt a Cripple all over his Body, are now recovered by drinking and bathing in theſe Waters two Seaſons.

VII. *An ESSAY concerning the Analyſis of human Blood; by Dr.* GEORGE MARTINE *Phyſician at St.* Andrew's.

I. *The Blood a heterogeneous Maſs.*

THOUGH the *Blood*, upon its firſt Eruption out of the Veſſels of Animals, ſeems to be an uniform red Liquor; every Body acknowledges it to be a very heterogeneous Fluid, and compoſed of Particles very much differing from one another. We are

are all ready to ſuſpect a Diſſimilarity of Parts in that Maſs, which is made up of ſuch a Multitude of different Ingredients, and which furniſhes ſuch a Variety of Appearances, and new Productions in the animal Body. In like manner, from the various Effects of different Medicines, and from ſome Particles diſplaying themſelves in a morbid State more ſenſibly than others, *Hippocrates* (*a*) inferred their prior Exiſtence in the *Blood*; though naturally, and in a ſound State, from their exact Mixture and Ballance, they do not diſcover themſelves by any ſenſible Effects.

II. *Its Compoſition, according to the Ancients.*

2. The moſt obvious Compoſition of the *Blood*, is of a thin watery Liquor, and a thick reddiſh Lump, into which we find it ſo ready to ſeparate (*b*), upon its Emiſſion out of the Body, throwing off at the ſame Time a volatile ſmelling Steam (*c*). The

(*a*) De vet. med. xxiv. De nat. hum. v. vi. viii.

(*b*) Galen. de elem. 1, 2. de melanch. 11. Avicen. lib. 1. Fen. 1. doct. iv. cap. 1. p. 23.

(*c*) Helmont. oper. p. 577. Cartes epiſt. 1, 80. p. 277. Cornel. progymn. phyſ. vii. p. 290. Malpigh. de polyp. cord. p. 130. Bellin. opuſc. ad Pitcarn. xxxix. p. 192. Boerhaave inſtitut. med. § 167.

red Part the Ancients looked on as the αἷμα the true proper *Blood*; and the other the φλέγμα, as its diluting *Serum*, or Whey, or *white Blood* (*a*). The Redneſs of the Muſcles, and other ſanguineous Parts, they juſtly reckoned the Effects of a greater Quantity of theſe red Particles, which conſtituted, according to them, the firſt and chief Element of the whole Maſs. And as they ſaw (*b*) watery Liquors ſeparated from the Kidneys and Skin in great Quantities, and other lymphatick Liquors in other Parts of the Body, they thought theſe to be the immediate Product of the *Serum* of the *Blood*; and ſo the φλέγμα came to be the ſecond Element. And obſerving this commonly to be of a yellowiſh Colour; and likewiſe finding a conſiderable Quantity of Bile of that Hue to be ſecerned from the *Blood*, they ſtraightway concluded it to be the immediate Product of theſe yellow Particles tinging the *Serum*, and another Element of the ſanguineous Maſs. This too they thought frequently to be ſecerned by Medicines, which therefore they called *Cholagogues*, or Purgers of *Bile*. And laſtly, becauſe the under Part of the *Craſſamentum* is generally of a very dark Colour, they

(*a*) Hippocr. de gland. 1, 6.
(*b*) Vid. Galen. com. in iii. epidem. 1, 5.

they reckoned it to be of the ſame Nature with the Blood or Liquor of the Spleen, and the blackiſh Liquors thrown out of the Body by Vomit or Stool. And ſuch, from a particular Prepoſſeſſion, were they pleaſed to call the μελαγχολία or *black Bile*, which they reckoned as the fourth Element of the *Blood*. And this Compoſition of the *Blood*, as made up of theſe four Elements, was moſt carefully cultivated, and the Theory and Practice of Medicine adapted thereto in all Times, from before the Days of *Hippocrates*, till the laſt Age, that it began to give Way to Principles of another Kind. The Chemiſts ſet up a Laboratory in our animal Syſtem; and the Philoſophers and Mathematicians introduced their Diagrams into the human Body.

3. We cannot deny, that from the *Blood* are produced *Phlegm*, *Bile*, and what the Ancients called *Melancholy*; and conſequently that all theſe exiſt, at leaſt virtually in the Blood: And ſo may we ſay of the *Saliva*, pancreatick Liquor, common Lymph, Oil, *Mucus*, *Lacrymæ*, *Semen*, Arteries, Veins, Nerves, Bones, *&c.* But we are not ſtraightway to infer, that all theſe did formerly exiſt in the ſame Form, as Elements or Principles thereof. What a great Share of their preſent Form and Ap-

pearance do theſe various Liquors and Particles owe to the Action of the Organs, to which they belong, and to the various Combinations and Circumſtances they undergo?

III. *The chemical Analyſis of the Blood.*

4. Some of the firſt Philoſophers (*a*) repreſented the human *Blood*, as the Product of *Air*, ſome as of *Fire*, ſome as of *Water*, and others as of *Earth*. There were not wanting ſome (*b*) who thought it was an Aggregate of ſuch Natures blended together. But the Chemiſts pretended to put the Compoſition of the Blood beyond Diſpute: By Diſtillation they reſolved it into *Water*, *Sulphur*, *Salt* and *Earth*; and theſe they affirmed to be the true Principles of which it is compounded.

5. But when we conſider the Matter fairly, all we can juſtly conclude from their Experiments, is, That the *Blood* upon ſuch a Heat being applied to it, and in ſuch and ſuch Circumſtances, is capable to exhibite ſuch and ſuch Subſtances of various Forms and Natures, though theſe, as they appear in the common chemical Analyſis,

(*a*) Vid. Hippocr. de nat. hum. i.
(*b*) Vid. Galen. de decr. Hippocr. &c. viii. 7.

lyſis, never did, nor never could exiſt in a living Animal. Indeed there is plainly a great deal of *Water* in our *Blood*. There is likewiſe *Sulphur* too, or the inflammable Principle. The great Quantity of Oil, wherewith all our Aliments abound, furniſh it ſufficiently: And the Fat exiſting in all Animals, ſhew plenty of it in the *Blood*, from which it is ſecerned: Nay, in ſome Circumſtances we can diſcover the oily Particles circulating in the Maſs of *Blood* (*a*). Innumerable Conſiderations, even the Taſte itſelf, convince us of *Salt* in the *Blood*; and there is no Room to doubt of *earthy* Particles likewiſe exiſting therein. And, beyond what the ordinary Chemiſts took ſufficient Notice of, the Air pump (*b*), as well as the Fire (*c*), and other Operations (*d*), ſhew there is *Air* in the *Blood*; that is to ſay, Particles which, when by themſelves, and ſeparated from the reſt, conſtitute a heavy elaſtick Fluid, readily mixing with, and not eaſily diſtinguiſhable from

(*a*) Malpigh. de oment. p. 42. Vit. poſthum. p. 92. confer & Ruyſch Theſ. anat. i. rep. 1, 3. p. 14.

(*b*) Boyle in phil. tranſ. lxiii. abr. ii. p. 228, &c. Phyſico-mech. exp. abr. ii. p. 540, 541, 634.

(*c*) Hales veg. ſtat. exp. xlix. p. 173.

(*d*) Papin. in phil. tranſ. abr. ii. p. 247. Boyle Phyſico mech. exp. abr, ii. 581, 641, —— 649. Hales veg. ſtat. exp. lxxx. p. 202. Boerhaave chem. ii. proc. cxv. p. 351.

common Air. But all these Elements, as they are called, can neither exist in the *Blood*, nor make up its Composition in the common Sense the Chemists were wont to understand them. The *aerial* Particles never exert their elastick Force in a healthy State (*a*), and the fetid, volatile and fixed *Oils*, and the alcaline *Salt*, are entirely the Effects of a Process that can never exist in the animal Body (*b*), and of a Degree of Heat no living Creature is able to bear (*c*).

IV. *The* Cartesian *Hypothesis of the Particles of the Blood*, &c.

6. What an odd Work did Mr. *Des Cartes*, and his mathematical Disciples, make in the animal Machine? The Particles of his several Elements served them upon all Occasions; and you would think they had really seen the different Spheres, Cubes, Prisms, Pyramids, Parallelopipeds, *&c.* circulating in the Mass of *Blood*; and wisely adapting themselves to all the Purposes they were pleased to appoint them; and passing through various Channels and Orifices

(*a*) Boerhaave chem. *i.* p. 525.

(*b* Helmont. oper. p. 91, 6, 7, 327, 35. Boerhaave chem. *ii.* proceſſ. 119.

(*c*) Boerhaave ibid.

fices of a round, ſquare, oval, triangular, quadrangular, oblong, or any other Figure you could fancy.

7. But they might have learned from *Fabr. ab Aquapendenté* (*a*) and Dr. *Gliſſon* (*b*), how readily all the Veſſels of an Animal would affect a round Figure; the Neceſſity of which was fully made out by Dr. *Pitcairn* (*c*). And as to the circulating Fluids, about which is our main Buſineſs at preſent, taking Things in a geometrical Light, upon a nearer View and the ſtricteſt Scrutiny, we can perceive no ſuch variouſly figured Corpuſcles in the *Blood* of Animals. All we can diſcern, when aſſiſted with the beſt Microſcopes, are ſpherical Particles ſwimming in a pellucid Liquor. This *Malpighi* (*d*) and *Leeuwenhoek* (*e*) diſcovered; and their Obſervations are eaſily verified by ocular Inſpection. And this leads us to a juſter and more intelligible Analyſis of the *Blood*.

V. *The*

(*a*) De form. fœt. ii. 2. p. 81.
(*b*) De ventric. &c. xxiii. 21.
(*c*) Diſſert. de circ. ſang. per vaſa, &c. § 15.
(*d*) Vit. poſth. p. 92. de polyp. cord. p. 130.
(*e*) Phil. tranſ. cii. p. 23.

V. *The Blood made up of Globules of different Orders or Magnitudes.*

8. By numberleſs Obſervations, *Leeuwenhoek* has ſhewn the largeſt and moſt viſible Particles of the *Blood* to be thoſe *Globules* which tinge it of a red Colour; and which therefore do chiefly make up what we call the *Craſſamentum* of extravaſated *Cruor*. They are of a certain determined Magnitude (*a*), the ſame in different Parts of the ſame Animal, and even in different Animals however differing in Bulk; of the ſame Size in an Ox, as in a Sheep, or a Rabbit (*b*). And theſe plano-oval Particles in the *Blood* of Fowls and Fiſhes, which reſemble thoſe *Globules* of terreſtrial Animals, are the ſame in the greateſt Whales, as in an Eel or a Frog; the ſame in an Eagle, as in a Sparrow. Thoſe greateſt Spherules we chuſe to call the *great red Globules of the Blood*, or, *the Globules of the firſt Order*.

9. Theſe are eaſily perceived by any body; but the ſharp-ſighted *Leeuwenhoek* went further, and diſcovered the Compoſition

(*a*) Arcan. nat. det. epiſt. lx. p. 78. Tabor. exerc. med. i. 1. § 2. p. 58.

(*b*) Leeuwenhoek ibid. & epiſt. cxxviii. p. 220.

ſition of theſe *Globules*, which he found (*a*) made up of ſix ſmaller Spheres cluſtered together in a very regular Way; and that ſo nicely, that in a perfect *Globule* the Compoſition comes to be imperceptible: But ſometimes he ſaw a red *Globule* looſening and breaking into theſe compounding Spherules; and ſometimes he had the good Fortune to perceive theſe running together, and beginning the Compoſition of a new *red Globule*. Theſe ſmaller Spherules we call *Globules of the ſecond Order*.

10. This curious and accurate Obſerver of the *minima naturæ* did not ſtop here; he ſaw (*b*) in the Chyle and *Blood* a great many Particles ſix Times leſs than theſe *Globules* of the *ſecond Order*, and thirty ſix Times leſs than the great *red Globules*. The *Globules* of the *ſecond Order* are then to be looked on as compounded of theſe ſmaller Particles, which therefore are juſtly to be reckoned as another Claſs, or *Globules* of a *third Order*.

11. But moreover, though the ſmaller *Globules* are perfectly tranſparent, and conſequently not diſtinguiſhable one from another,

(*a*) Ibid. Epiſt. lvi. p. 8. Epiſt. lvii. p. 36. Epiſt. cxxviii. p. 221, 222. Anat. & contempl. contin. p. 119, 120, 121.

(*b*) Arcan. nat. det. epiſt. lvi. p. 12. Anat. & contempl. § 1, p. 30, 34, 35. Contin. p. 119.

other, we are certain from the ſame Mr. *Leeuwenhoek*'s Obſervations, that there are innumerable Veſſels of ſuch a Smallneſs, that none of theſe hitherto mentioned *Globules* could paſs: ſo that it is neceſſary to ſuppoſe inferior Claſſes of *Globules* of the *fourth*, *fifth*, *ſixth*, &c. *Orders*. Whence by Analogy we are to conceive *Globules* of the *third Order*, made up of *ſix Globules* of the *fourth*; and theſe again made up of ſix of the *fifth Order*; and ſo on thro' ſeveral Degrees, the Number whereof we are not to take upon us to determine. *Leeuwenhoek* (*a*) ſaw Veſſels, the Wideneſs of which was leſs than the eighth Part of the Diameter of a *red Globule*; ſo that the Particles paſſing through them ſhould be upwards of five hundred Times leſs than ſuch *Globules*, and conſequently ſmaller than thoſe of the *fourth Order*. Yea, upon a careful Examination (*b*), he could perceive ſtill ſmaller Veſſels, narrower than the tenth Part of the Diameter of a *red Globule*, and conſequently not capable of tranſmitting Spherules greater than if a *red Globule* were broken down into a thouſand Parts. Theſe ſhould almoſt coincide with *Globules* of the *fifth Order*; and that as near

(*a*) Anat. & contempl. § 1. p. 31.
(*b*) Ibid. p. 32.

near as we can expect Obſervations of ſuch minute Things to carry us.

12 What a beautiful Harmony and Regularity do we here perceive in the Conſtruction of the Maſs of *Blood!*

Magnum certe opus oculis video.

The *Globules* of the *firſt Order* are made up of ſix *Globules* of the *ſecond*, theſe of ſix of the *third*, theſe of ſix of the *fourth*, theſe of ſix of the *fifth Order*, and ſo on. And accordingly we find the *Globules* of the higher *Orders* may be broken down into their compounding Particles. In ſome Caſes, that the Blood may be turned into *Serum*, αἷμα διωρρωσθαι, was obſerved by *Ariſtotle* (*a*). Nor did ſuch a Change of the Blood (*in ſerum ſanguis tandem ferè totus degenerat*) eſcape the Obſervation of the accurate Dr. *Harvey* (*b*). But the judicious and moſt careful *Boerhaave* (*c*) has moſt diſtinctly of all obſerved how very apt the *Globules* of the higher *Orders* are to loſe their Contexture, and to be broken down into the ſmaller compounding Particles, when they are left to themſelves, and

(*a*) Hiſt. animal. iii. 19.
(*b*) De gen. animal. li. p. 160.
(*c*) Aphor. § 94, 95. chem. ii. proc. 127.

and without the Aſſiſtance of the Circulation.

13. It ſeems to be very well worth obſerving, That juſt ſix ſmaller Spherules ſhould make up a larger *Globe*, if you were to chuſe the moſt convenient and firmeſt Way of conſtructing it. Were there but 2, 3, 4, or 5 compounding *Globules*, then in the running together of theſe, the new compounded Particle would be too angular, and its Parts eaſily disjoined. On the other Hand, were there 7, 8, 9, or 10, *&c.* too many of them would be out of Contact from the reſt, and conſequently for that Reaſon, not adhering ſo firmly neither; and ſo their Coheſion likewiſe eaſily diſſolved. But in a regular Coaleſcence of ſix, every Spherule is in Contact with other four, juſt in four equidiſtant Points; ſo that they are very firmly joined, and not very ſubject to a Diſſolution from external Injuries. In *Fig.* 1 and 2 of *Tab.* I. we have the ſix ſmaller Spherules, but juſt touching one another, before they run together. In *Fig.* 1. we have a View of five of them, A, B, C, D, E, the ſixth F, being out of Sight: But turning them a little, as in *Fig.* 2. we ſee diſtinctly all the ſix compounding Spherules, three of them lying before, and as many behind. In *Fig.* 3 and 4. we ſee the

ſame

ſame Spherules adjuſted to one another, and compacted together into one greater Globe; wherein I have expreſſed the Lines of Contact, by which we conceive they are run together, and where they would looſen if they were to be diſſolved and broke aſunder. It ſeemed the more neceſſary to give this Delineation that *Leeuwenhoek*'s own Figures (*a*) are not very regular, nor apt to give a juſt enough Idea of the Coaleſcence of the compounding Particles, or of the true Conſtruction of the compounded *Globule*.

14. From this Conſtruction of the *Blood*, we ſee no Room left for *Bohn*'s (*b*) Idea of the *red Globules*, as made up of viſcid *Bullulæ* incloſing little Spherules of Air, which *Bernouilli* (*c*), *Keil* (*d*), and ſome others of our mathematical Phyſiologiſts (*e*) thought ſo much for their Purpoſe. And when, from microſcopial Obſervations (*f*), they found a *Globule*, upon its Arrival at a ſmall Veſſel

(*a*) Arcan. nat. det. epiſt. lv. p. 2. Epiſt. cxxviii. p. 221, 222.

(*b*) Circ. anat. xiii. p. 199.

(*c*) Diſſert. de mot. muſc. § 5.

(*d*) Tentam. v. p. 135.

(*e*) Mead of Poiſons i. p. 15. Cheyne's phil. Princ. of Relig. Vol. i. p. 309. Wainewright of the Non-natur. vi. 16. p. 64.

(*f*) Vid. Leeuwenhoek Arcan. nat. det. epiſt. lxv. p. 161. in phil. tranſ. cxvii. p. 380. Cowper in phil. tranſ. cclxxx. abr. v. 1. p. 331.

Veſſel it was not able eaſily to go through, to be compreſſed and flatned in its Paſſage; and immediately when got into a wider Channel, to reſume its former round Figure, they forthwith concluded that Appearance to proceed from an incloſed elaſtick Fluid, reſtoring itſelf after Compreſſion. How much more ſimple, yea obvious, would it have been to have had Recourſe to that common Property of all Fluids, whoſe Particles, when touching one another, affect to form themſelves into a ſpherical Figure. This is the *Appetite of Continuation*, or *Union* of my Lord *Verulam*, the *Congruity* of *Hook*, the *niſus in contactum*, and the *vis cohæſionis*, and *contractio naturalis* of *Bellini*, which Sir *Iſaac Newton* choſe to call by the old Words, *Attraction* and *Gravitation*; which theſe great and inquiſitive Philoſophers, following the wiſeſt of the Ancients, found to be inherent in all Bodies we have Occaſion to make our Obſervations upon, and to be the immediate Cauſe of many of the principal *Phænomena* of Nature.

15. Not only the compounding Particles of each *Globule* are endowed with this Property, but likewiſe the *Globules* themſelves, have a very ſtrong mutual Attraction or *niſus in contactum & cohæſionem*.

When

When extravaſated *Blood* is left to itſelf, we ſoon perceive how forcibly the *red Globules* run together and coaleſce, and ſqueeze out the intervening *Serum* in ſome Animals with a greater, in others with a ſmaller Force. This Force in the *Blood* of Deers is ſo weak, as that it ſcarcely coagulates into a firm *Craſſamentum* (*a*). On the contrary, in ſome great and ſtrong Beaſts, it becomes a tough and almoſt indiſſoluble Maſs: So that the *Blood* of Bulls was frequently drunk by the Ancients as a moſt effectual Poiſon (*b*). Nay, even the pellucid watery *Serum*, which conſiſts of *Globules* of inferior *Orders* and Magnitudes, is very ready to loſe its Fluidity: In a certain Degree of Heat, before much of it is exhaled, it becomes a firm and ſolid Subſtance (*c*).

16. It will perhaps be asked what we have done with the *Fibres* (*Ives*), which many, and theſe great Men too, have deſcribed as very eſſential Parts of the *Blood* of Animals. But if we deal candidly, tho'

(*a*) Ariſtot. hiſt. animal. iii. 19. De part. animal. ii. 4. Meteorlog. iv. 7. Plin. hiſt. nat. xi. 38.

(*b*) Herodot. hiſt. iii. 15. Plin. hiſt. nat. xi. 38. xx. 9. xxiii. 7. Plutarch. in vita Themiſtocl.

(*c*) Golzadius apud Barbat. diſſ. de ſang. &c. p. 10. Boyle of Fluids, &c. Abr. i. p. 329. Uſeful of exper. Philoſ. Abr. i. p. 32. Lyſer in Barthol. epiſt. med. 11, 33. p. 503. Malpigh. epiſt. 1. de pulm. p. 131. Tabor. exerc. med. p. 66.

even *Malpighi* (*a*) did ſtrenuouſly ſtand up in their Defence, I am afraid we muſt yield to the ſuperior Force of *Borelli*'s (*b*), and *Bohn*'s (*c*) Arguments, and confeſs that we can find no Veſtiges of them in the *Blood* in a natural State. If they were in the Veſſels of Animals, they could not but diſturb the Circulation. And their Exiſtence ſeems to be entirely owing to a ſubſequent Preparation of extravaſated *Blood*, whoſe viſcid Parts, by the Heat of warm Water, and Conquaſſation, or ſome other ſimilar Artifice, run together in ſuch new Forms.

VI. *Of the Temperaments denominated from the conſtituent Parts of the Blood.*

17. All Animals (I mean ſuch as we are chiefly concerned with) have *Globules* of all the ſeveral *Orders*, ſcattered through their *Blood*; but in no certain or fixed Proportion: Which may likewiſe be affirmed of the conſtituent Parts of the *Blood*, when they are conſidered as giving Riſe to the compounding Humours of the Ancients, and to the chemical Elements. From the Conſideration of which Variety, it will be of

(*a*) De polyp. Cord. p. 125. Vit. poſthum. p. 45.
(*b*) De mot. animal. ii. Prop. 132. p. 168.
(*c*) Circ. anat. xiii. p. 187.

of Use to take a View of the various *Temperaments* of the human Body, so much talked of, and so little understood, that we may the better understand the Systems of the Ancients, and also have some Idea of a *middle Constitution*, to which all the Calculations relating to the Properties of the *Blood* are to be referred.

18. If the *Blood* be plentiful, and abound with *red Globules*, or those of the *first Order*, such a State will plainly enough constitute what the Ancients called *temperamentum sanguineum*; the Symptoms whereof are easily explained from these Circumstances.

19. When the *red Globules* were scarce in the *Blood*, and it was found thin and watery, this was called a *phlegmatick Temperament*.

20. If the *Blood* happened by any means to acquire a great many thick, tough, and less moveable Particles, these the Ancients looked on as the chief Ingredients in the *atra bilis*; and such a Constitution was with them the *temperamentum melancholicum*, which the learned *Boerhaave* (*a*) thinks may be better explained from Chemy; and that in such a State, it is chiefly

(*a*) Inst. med. § 228. Aphor. § 1032, 1095. Vid. & Pechlin. de purg. p. 45.

the *earthy* and ſome of the more viſcid *oily* Particles that abound.

21. Our Aliments are generally of an aceſcent Kind, or the Product of ſuch; but by the Action of our Bodies on them, they are ſoon reduced to a neutral State. Yea, ſuch is the Frame of Animals, that the Force of the Circulation bringing the Particles of the *Blood* always farther and farther from their former Acidity, animalizes them (if I may uſe the Word) more and more, renders them volatile, and perſpirable (*a*); and at length, if there be no new Supplies or Obſtacles to hinder it, even diſpoſes them to an alcaleſcent State (*b*); the Breath ſtinks (*c*), and the *Blood* turns putrid (*d*). Now the *Bile* is found (*e*) to have undergone a long Courſe and Circulation, before it is ſeeerned from the reſt of the *Blood*, and to be one of the moſt perfect animal Liquors, and the furtheſt removed from any aceſcent Quality; and in Plenty and Perfection in thoſe who have a ſtrong Cir-

(*a*) Helmont. p. 91, 4. p. 148, 31. p. 149, 34. p. 150, 39. p. 151, 45. p. 177, 60.

(*b*) Vid. Boerh. aphor. § 80, 109. Chem. ii. proc. 88. p. 293. Proc. 95. p. 313. Proc. 100. p. 323.

(*c*) Ariſtot. Probl. xiii. 7. Petron. Satir. § 128. Martial. Epigr. iv. 4.

(*d*) Vid. Boerh. ubi ſupra.

(*e*) Vid. Boerh. inſt. med. § 99.

Circulation, and all their vital Operations carried on with Vigour (*a*). And it is ſuch a Conſtitution going to too great a Height, that will truly make what the Ancients called a *cholerick* or *bilious hot Temperament*.

22. The direct contrary of which, importing an irregular and weak Circulation, and not ſufficient to overcome, and alter the Diſpoſition of our Aliments, ſeems to coincide in a great meaſure with the *Cachexia* of the Ancients (*b*); which might be looked on as a ſort of *Temperament*, and a Deviation from the natural and regular Conſtitution; and not ſo properly to be a particular Diſeaſe, as a State of the Body giving Riſe to a great many Diſeaſes eaſily flowing from ſuch a State. And this frequently falls in with the *phlegmatick Temperament*; as on the other hand, the *ſanguineous* and *cholerick* are oftentimes blended together. You might find out other general Deviations of the Body from a middle State, which might be called *Temperamentum oleoſum*, *ſalinum*, *calidum*, *frigidum*, &c. as you pleaſe to conſider the various Ingredients and Diſpoſitions of the *Blood*, and Operations of the Body.

(*a*) Hoffman. med. rat. i. p. 182.

(*b*) Vid. Aret. de chronic. cauſ. &c. i. 16. Cæl. Aurelian. chronic. iii. 6.

23. Πάντων δὲ ἄριστα διάκειται ἀνθρωπ☉---μηδεμίην δύναμιν ἰδίην ἀποδεικνύμε☉ (*a*). The *Blood* then, which is as it were in a Middle between all these, which has neither too much *Cruor*, nor too much *Serum*, (οὔτε λίαν παχὺ, οὔτε λίαν λεπτὸν (*b*), nor too much *Earth*, *Salt*, or *Oil*, nor the Product of too weak, nor of too strong a Circulation, we call the Blood of a *regular Constitution*, or *middle Temperament*, to which the rest are to be referred, and which People are understood to mean, when they speak of the Blood in general, and in a sound State. Ὑγιαίνειν μὲν οὖν μάλιστα, ὅκ ὅταν μετρίως ἔχῃ ταῦτα τῆς πρὸς ἄλληλα χρήσι☉ καὶ δυνάμι☉ καὶ τοῦ πλήθεος, καὶ μάλιστα, ἢν μεμιγμένα ᾖ. Ἀλγέει δὲ, ὁκόταν τι τουτέων ἔλασσον, ἢ πλεῖον εἴη, καὶ μὴ κεκριμένον ἢ τοῖσι ξύμπασιν (*c*). And indeed we are all but too liable to a Deviation from this desirable middle State. The *Blood* of very young ones is generally thin and watery, that of old People, thick and black; but the middle-aged Folks are readiest to have a biliary and sanguineous Disposition. Ἐν μὲν τοῖς πάμπαν νέοις τὸ αἷμα ἰχωροειδὲς ἐστι καὶ πλεῖον, ἐν δὲ τοῖς γέρουσι, παχὺ καὶ μέλαν καὶ ὀλίγον, ἐν ἀκμάζουσι δὲ μέσως (*d*).

VII. *The*

(*a*) Hippocr. de vet. med. xxxv. 18.
(*b*) Aristot. hist. animal. iii. 19.
(*c*) Hippocr. de nat. hum. vi. 1.
(*d*) Aristot. hist. animal. iii. 19.

VII. *The Proportions of the chemical Elements.*

24. The Ancients did not pretend to determine the Proportions their four Elements bear to one another. But the Chemiſts have had a better Opportunity to make a tolerable Eſtimate of the Quantities of their Principles of the human *Blood*, which however you are not to expect as perfectly exact, or nearly alike in all Trials. However, by way of Example, we ſhall take an Experiment of the accurate Mr. *Boyle* (*a*), who, by diſtilling ten Ounces and ſeventy three Grains of human *Blood* at a ſlow Fire, found it to yield the following Subſtances.

	Grains.
Phlegm riſing by a gentle Heat, differing little (*b*) from common Water, with two or three Grains of volatile Salt diſſolved in it,	3527
Volatile Parts loſt in Diſtillation, which we preſume to be of the ſame Nature with the collected Phlegm, - - -	266

(*a*) Hiſt. hum. Blood, p. 231. Abr. iii. p. 459.
(*b*) Vid. Vieuſſens in phil. tranſ. 241. Abr. iii. p. 243.

	Grains.
And ſo theſe two Phlegms put together,	3793
The dry Subſtance or *Reſiduum* of this Diſtillation,	1080
This *Reſiduum*, diſtilled a ſecond Time at a ſtronger Fire, gave,	
Fetid Oil,	168
Dry volatile Salt purified from its adhering Spirit,	65
Volatile Saline Spirit collected,	48
Particles loſt, partly this Saline Spirit, and partly Air, which in this Period of the Diſtillation begins to riſe (*a*),	427
The Air thrown off by ſuch a Diſtillation, according to *Hales*'s Experiment (*b*), ſhould be,	171
And ſo the Spirit loſt was,	256
Which added to *gr.* 48, the former volatile Saline Spirit makes	304
Caput mortuum	372
The *gr.* 168 of fetid Oil analyſed in *Vieuſſens*'s Way (*c*), ſhould have given	
Saline Spirit,	99
Yellow thick Oil,	60

Fixed

(*a*) Hales veg. ſtat exp. xlix. p. 173. Exp. li. p. 174.
(*b*) Ibid. exp. xlix. p 173.
(*c*) Phil. tranſ. 241. Abr. iii. p. 245.

	Grains.
Fixed Salt, - - - -	3
Fixed Earth, - - - -	6

The *gr.* 304, and *gr.* 99 of Saline Spirit, making in all *gr.* 403, analyſed according to a like Method (*a*), ſhould have given,

Water, - - - -	278
Volatile Salt, - - - -	125

Caput mortuum, *gr.* 372, calcined, gave,

Fixed Salt, - - - -	18
Moſt fixed Earth, - - - -	26
Particles evaporated in the open Fire,	328

The Proportions of whoſe Ingredients cannot well be determined; but from ſome ſort of Analogy we gueſs them to be about theſe following, neglecting the Air, which too perhaps was diſſipated at this Time.

Oil, - - - -	273
Salt, - - - - -	22
Earth, - - - -	33

From all which the Blood being Unity, conſiſting of *gr.* 4873, a Chemiſt would reckon

(*a*) Boyle hiſt. hum. bl. p. 112, 125, 126, 242. Abr. iii. p. 473, 475.

reckon theſe Elements in the following Proportions,

Water - -	*gr.* 4068 - -	$\frac{5}{6}$
Oil - - -	333 - -	$\frac{1}{15}$
Salt - - -	190 - -	$\frac{1}{25}$
Earth - - -	65 - -	$\frac{1}{75}$
Air - - -	171 - -	$\frac{1}{28}$

25. Thus we ſee how vaſtly the watery or *phlegmatick* Part of the *Blood* abounds above the other Principles. It takes up $\frac{5}{6}$ Parts of the whole Maſs; and other Experiments (*a*) ſhew it ſtill in a greater Quantity: And it exceeds the *Oil* or *Sulphur* above a Dozen Times; and the *Oil* is in greater Plenty than any of the reſt of the Ingredients. However I ſhall not ſay but ſome of theſe Elements may ſtill be reſolved into one another, or into more ſimple Parts, ſo as to increaſe or diminiſh the above Proportions.

VIII. *The proportional Quantities of the Globules of different Orders.*

26. But our main Buſineſs, as being hitherto leſs minded by Phyſicians, is rather to determine the Proportions and various Properties of the Parts or Elements of the *Blood*,

(*a*) Boyle ſcept. chem. abr. iii. p. 286. Boerh. chem. ii. Proc. 119.

Blood, analysed in the most simple, that is, (if on this Occasion we may be allowed the Expression) in a geometrical Way, and to find out the several Quantities of the *Globules* of different *Orders*. Now in cold and sufficiently coagulated *Blood*, the tough *Crassamentum*, and its surrounding Fluid, *Serum*, are ordinarily found (*a*) to be pretty near equal to one another. And Dr. *Jurin* (*b*) supposes the Interstices of the *red Globules* of the *Crassamentum* to be nearly equal to the *Globules* themselves, so as to render them $\frac{1}{4}$ of the whole Mass.

27. The Interstices would indeed take up almost such a Space, if the *Globules* were all regularly disposed, so as to ly perpendicular over one another in a square Form. But it is plain they could not well subsist in that State: Their natural Lubricity would be readier to dispose them in a more compact Figure, as perhaps in a quincuncial Order or so. And in such a Case, by a Calculation, differing considerably from *Tabor*'s (*c*), I find that the interspersed *Spatiola* put all together, would take up but $\frac{1}{4}$ of the *Crassamentum*, and the *Blood Globules* $\frac{3}{4}$ thereof: So that on this Sup-

(*a*) Vid. Boyle hist. hum. bl. p. 252. Abr. iii. p. 460.
(*b*) Phil. trans. 361. Abr. v. 1. p. 326.
(*c*) Exerc. med. i. 1. § 5. p. 61.

Suppoſition, theſe would be $\frac{3}{8}$ Parts of the whole Maſs. But neither is it likely they ſhould be ſo very regularly and compactly diſpoſed; and therefore, making ſome Allowances for Irregularities, it may ſeem reaſonable rather to reckon, that theſe *Globules* ſhould take up only about $\frac{2}{3}$ of the *Craſſamentum*, and conſequently $\frac{2}{6}$ or $\frac{1}{3}$ of the Maſs, and the *ſerous* Part to take up the other $\frac{2}{3}$ thereof. In this Caſe the *red Globules* being ſuppoſed to be ſcattered uniformly through the *Blood*, their mean Diſtance from one another by a geometrical Calculation, comes out about $\frac{1}{4}$ Part of their Diameters: And this falls in nearly with *Tabor*'s (*a*) Obſervation; which however I will not ſay was made, or could well be made with ſufficient Accuracy.

28. Now as the *Blood* is a Compound of *Globules* of all the ſeveral *Orders*, ſo is the *Serum* a Compound of the *Globules* of the *ſecond Order*, and of all the inferior *Orders*. And as the *red Globules*, or thoſe of the *firſt Order*, take up a third of the whole Maſs, ſo from Analogy (and we have no other Way left us to determine the Matter) it is not improbable that theſe of the *ſecond Order* ſhould take up a third Part

(*a*) Exerc. med. i, 1. § 5. p. 60.

Part of the *Serum*, and that the other two Thirds are made up of Globules of the *third* and ſubſequent *Orders*, and ſo on in this Progreſſion.

The intire Maſs of *Blood*, - - -	1
Globules of the *firſt Order*, - -	$\frac{1}{3}$
Serum, - - - - - -	$\frac{2}{3}$
Globules of the *ſecond Order*, -	$\frac{2}{9}$
The reſt of the *Serum* conſiſting of *Globules* of the *third* and inferior *Orders*, - - -	$\frac{4}{9}$
Globules of the *third Order*, - -	$\frac{4}{27}$
The Remainder of the *Serum*, being *Globules* of the *fourth* and inferior *Orders*, - -	$\frac{8}{27}$
Globules of the *fourth Order*, - *q. p.*	$\frac{1}{10}$
The Remainder, being *Globules* of the *fifth* and inferior *Orders*, -	$\frac{1}{5}$
Globules of the *fifth Order*, - -	$\frac{1}{15}$
The Remainder, being *Globules* of the *ſixth* and inferior *Orders*, -	$\frac{2}{15}$
Globules of the *ſixth Order*, - -	$\frac{2}{45}$
Aggregate of the *ſeventh* and inferior *Orders*, - -	$\frac{4}{45}$
Globules of the *ſeventh Order*, - *q. p.*	$\frac{1}{34}$
Aggregate of the *eighth* and inferior *Orders*, - - -	$\frac{1}{135}$
Globules of the *eighth Order*, - -	$\frac{1}{51}$
Aggregate of the *ninth* and inferior *Orders*, - - - *q. p.*	$\frac{1}{255}$

Globules

Globules of the *ninth Order*, - - $\frac{2}{75}$
Aggregate of the *tenth* and inferior *Orders*, - - - *q. p.* $\frac{1}{375}$
Globules of the *tenth Order*, - $\frac{1}{1125}$
Aggregate of the *Globules* of the *eleventh* and inferior *Orders*, if there be such, - - - - $\frac{1}{5625}$

IX. *The Density of the Mass of* Blood.

29. Having thus considered the several Quantities of the compounding Particles of the *Blood*, it is convenient next to determine their specifick Weight or Quantity of Matter contained under a given Bulk, comparing them, as also the entire sanguineous Mass, to some other Body of a fixed and determinate Density, as common Water, which is the ordinary Standard for such Calculations.

The truly Honourable Mr. *Boyle* (*a*), as he began a great many curious Researches of this Kind; so he was the first who attempted to settle the comparative Weight of human *Blood*, which, according to his Trial, came out to be to Water as 1041 to 1000. But as his Experiment was not done with that Accuracy as to satisfy himself,

(*a*) Hist. hum. bl. p. 36. Abr. iii. p. 450.

ſelf, who in every thing was very ſcrupulous, he recommended it to the further Enquiry of others. And accordingly the accurate Dr. *Jurin* (*a*), by a Set of Experiments of this Kind, found the Denſity of the *Blood* to be 1054. As far as I can judge, by comparing it with Rain Water, or that of a clear limpid Rivulet, but differing little from Rain Water, and taking great Care that there be no Bubles of Air in the *Blood* when I made my Experiments, I found their Denſities as 1000 to 1056, or 1057, or as 18 to 19, *q. p.* Perhaps the Water I uſed being lighter than the common *London* Water, which I preſume was made Uſe of in *Jurin*'s Experiments, might occaſion this ſmall Variation.

30. But we muſt obſerve a very remarkable Difference in the *Blood*, according to its different States; whether as circulating in the Veſſels of the Animal, or as it is expoſed to the cold Air; in which Condition we commonly examine it: From whence, after ſufficient Allowances, we muſt inveſtigate its real and natural Denſity, while in a live State.

We know all Bodies whatſoever to be ſomewhat condenſed by Cold, and expanded

(*a*) Phil. tranſ. 361, Abr. v. 1. p. 324.

ded again by Heat; ſo that we can ſafely affirm the cold *Blood* to be ſpecifically heavier, than the warm Fluids circulating in the Veſſels of a living Animal; but by how great an odds, is not ſo obvious or eaſy to be determined.

31. Some People ſeem to eſtimate the Heat and Denſity of the living *Blood*, according to what they find it upon its firſt Emiſſion out of the Body: In which Caſe it is plain, that in its very Exit, and while you collect a ſufficient Quantity to make your Experiment, it has loſt conſiderably both of its Heat and natural Expanſion.

32. One would be ready to judge of the Expanſion of *Blood*, from what we find it in Water. Now Dr. *Halley* (*a*) found Water, reaſonably cold, but not freezing, to be expanded $\frac{1}{26}$ Part by boiling; that is, as I judge, from *grad.* 2 to *grad.* 34 $\frac{1}{2}$, in a Thermometer conſtructed in Sir *Iſaac Newton*'s Way: The ſame Difference was aſſigned by *Leeuwenhoek* (*b*). Whence Water in a temperate Degree of Heat, about *grad.* 4, ſhould be expanded $\frac{1}{93}$ Part, by the Heat of *grad.* 12 $\frac{8}{10}$, to which I find the Thermometer riſes by the *Blood* of thoſe living

(*a*) Phil. tranſ. 197. Abr. ii. p. 34.

(*b*) Arcan. nat. det. epiſt. lxviii. p. 214. *See too* M. de Reaumur mem. de l'acad. des ſciences 1730, p. 691.

living Animals, whoſe vital Operations come neareſt to the human, not *grad.* 14 $\frac{3}{11}$, as Sir *Iſaac Newton* (*a*) and Mr. *Hales* (*b*), by ſome Miſtake reckoned it. But by repeating ſome Experiments of this Nature, I could not perceive the Expanſion to be near ſo great, as is deduced from *Halley*'s and *Leeuwenhoek*'s Experiments. Perhaps in their boiling Water, there were ſome Air-Bubbles, which they did not conſider.

33. This makes me ſuſpect ſome Miſtake to have been likewiſe in Dr. *Tabor*'s (*c*) Experiment, by which he determined the cold *Serum*, when brought to the Temperature of living *Blood*, to be expanded $\frac{1}{62}$ Part.

If theſe Authors have aſcribed too great a Dilatation to Water or Blood heated to a certain Degree, I ſuſpected that on the other hand Dr. *Boerhaave* had allowed Water too ſmall a Rarefaction, when from *grad.* 56 in *Fahrenheit*'s Thermometer to *grad.* 212, when it was in a boiling State, he reckoned it dilated only $\frac{1}{81}$ Part; and conſequently from *grad.* 53 (which coincides with *grad.* 4 in *Newton*'s Thermometer) to *grad.* 100, (which nearly anſwers

(*a*) Phil. tranſ. 270. Abr. iv. 2. p. 2.
(*b*) Veg. ſtat. l. exp. 20. p. 58.
(*c*) Exerc. med. l. 1. § 7. p. 63.

to *Newton*'s *grad.* 12, 8) it should be no more than $\frac{1}{280}$ Part.

34. Weighing carefully a certain Quantity of *human Blood*, drawn from a Man in Health in the Morning, and flowing directly into a Phial that was immersed in Water, which raised the Liquor in the Thermometer to *grad.* 12,8; and then letting it cool in a temperate State of Air, about *grad.* 4, I found it condensed $\frac{1}{135}$ Part. So that the Density of the *Blood*, when circulating in living Animals, is to its Density, when reduced to the Coldness of temperate Air, as 134, to 135, or 992 $\frac{1}{2}$ to 1000. Water and Urine tried the same Way, suffered very near the same Degrees of Rarefaction and Condensation. Hogs *Blood* seemed to undergo some greater Change: But the Difference was very small; no greater than what might flow from a greater Quantity of oily Particles in its Composition: And we know Oil is more rarefied by a given Degree of Heat than Water.

35. There is however one Consideration too often neglected; but which nevertheless must be taken in, before we can apply our Calculations with the desired Accuracy to Liquors in different Degrees of Heat. The Vessels, in which our Areometrical Experiments are performed, suffer likewise

a

a Dilatation, by the Application of Heat, though in a much less Degree than the contained Fluids. It is the Excess of the Expansion of these above the Dilatation of the containing Vessels, that is commonly recorded in Observations of this Kind: But they must both of them be taken in to determine the real Changes the Fluids undergo in the different States of Heat and Cold. Glass I suppose from good Reasons may be lengthned by the Heat of the human Body about $\frac{1}{120}$ Part of its Dimensions; so that a thin Glass Phial shall be enlarged in its Contents about $\frac{1}{40}$ Part. Whence the real Density of cold Blood, to its Density when circulating in a live Animal, comes out in a compound *Ratio* of 135 to 134, and 400 to 399, which is nearly, as 100 to 99. And so, from what has been said, we may conclude the real Densities of Water and *Blood* to be in these Proportions,

Water in a temperate Degree of Heat, - - -	1000
freezing, - - -	1004
of the Heat of the *Blood* in the human Body, -	990
Blood of the Heat of temperate Air,	1056
in its natural living State -	1045$\frac{4}{5}$

36. Hence we ſhall be able to determine the Weight of a given *Moles* or Bulk of *Blood*, which is not ſo accurately done hitherto as it deſerves: This being of ſingular Uſe in our Enquiries concerning the Velocities, Moments, *&c.* of the circulating Liquors, and the Forces of the Heart, and other Organs in the animal Machine.

From the accurate Experiments of Dr. *Bernard*, Sir *Iſaac Newton*, Mr. *Everhard* and others, we conclude a cubick Inch of Rain Water to weigh 253 $\frac{1}{3}$ Grains. Whence a cubick Inch of warm *Blood*, ſhall be found equal to *gr.* 253 $\frac{1}{3} \times \frac{1040}{1000} = 264\frac{3}{4}$: And an Ounce of *Blood* will be 1,813 Inches. An *Averdupois* Ounce (which nearly coincides with the ancient *Roman* ſtandard Weight) according to the very nice Experiments of Mr. *Everhard*, and Mr. *Stewart* Profeſſor of Natural Philoſophy in the Univerſity of *Edinburgh*, is found to weigh *gr.* 437$\frac{1}{2}$; and therefore is in Water equal to 1,727 Inches; and 1,6526 Inches of warm *Blood*.

Seeing from the Principles of Geometry, a Cube is to its inſcribed Sphere, as 1 to 0,5236, it eaſily follows that a Globe of Water of an Inch diameter muſt be *gr.* 253 $\frac{1}{3} \times$ 0,5236 = 132 $\frac{2}{3}$ *q. p.* and a Sphere of *Blood* of the ſame Size ſhall weigh *gr.* 138 $\frac{5}{8}$.

X. *The*

X. *The Denſities of the Globules of different Orders.*

37. And now we come more cloſely to Work, to determine the Denſities of the ſeveral Parts of the ſanguineous Maſs, wherein Mr. *Boyle*, otherwiſe very accurate, has led very many leſs-examining People into a moſt enormous Error, when, by ſome Miſtake or other in theſe Experiments (*a*) he moſt truſted to, he reckoned the ſpecifick Weight of *Serum* to that of Water, as 1174 to 1000, and conſequently a good deal heavier than that of the common Maſs or *red Blood*. A thouſand Obſervations and Circumſtances may convince us of the contrary; but we ſhall confine our ſelves to theſe Experiments that determine directly their ſpecifick Weights with the greateſt Accuracy. We formerly (*b*) found the Denſity of cold *Blood* to be 1054, or rather 1056: And Dr. *Jurin* (*c*), from a great many Trials, all done with utmoſt Care, concludes the ſpecifick Weight of *Serum* to be only 1030. Dr. *Tabor*'s (*d*) Obſervation

(*a*) Hiſt. hum. bl. p. 71. Abr. iii. p. 461.
(*b*) § 29.
(*c*) Phil. tranſ 361. Abr v. 1. p. 323.
(*d*) Exerc. med. l. 1. § 7.

makes it 1031: And I found it nearly the same. So that when compared to limpid Rain Water, it may safely enough be reckoned 1032, which is then $\frac{1}{43}$ Part lighter than Blood. The *Serum* therefore, when reduced to the Heat of live *Blood*, should be $1032 \times \frac{99}{100} = 1021\frac{2}{3}$.

38. Since the *Crassamentum* is about one half of the whole Mass (*a*), it, when taken by itself, must as far exceed in Density the common Mass, as this does the *Serum*; and consequently should be 1080, to which Supputation Experience comes very near. For as a Medium of several Trials, Dr. *Jurin* (*b*) found it 1084. The very different Consistence of the *Crassamentum* of the *Blood* of different Persons will not allow us to expect a great Uniformity in such Experiments; however I found it generally something above 1080. Perhaps the handling of it might have squeezed out several of the thinner and lighter Particles of the interspersed *Serum*; so that we found it specifically heavier than naturally it should have been.

39. About two Thirds of this Mass of *Crassamentum* is taken up by *red Globules*, the

(*a*) § 26.
(*b*) Phil. transf. ibid. p. 327.

the other Third by *Serum* (*a*); from whence the Denſity of theſe *Globules* is found 1104. It comes out the ſame from our former Determinations of the Denſity of *Serum*, as 1032 (*b*), and that of *Blood* as 1056 (*c*); and the *red Globules* being a Third of the intire Maſs of *Blood* (*d*). It is true Dr. *Jurin* reckoned (*e*) the ſpecifick Gravity of the *Blood Globules* to be 1126; but he ſuppoſed the Quantity of theſe *Globules* only a fourth Part of the whole Maſs; whereas the Reaſons formerly adduced, obliged us to reckon them a Third thereof. So then the true Denſity of a *red Globule* circulating in the *Blood* of a living Man, is $1104 \times \frac{29}{100} = 1093$.

40. And thus we have found that the *red Globules*, or thoſe of the *firſt Order*, are the heavieſt Parts of the *Blood*; and that they, as well as the groſſer *Serum*, by being broken down into ſmaller *Globules*, loſe ſomething of their ſpecifick Weight: So that it is very obvious to infer, that as the *Globules* of the *firſt Order* are the denſeſt, as well as the biggeſt Particles of the *Blood*, ſo theſe of the *ſecond Order* come neareſt to them in each of theſe Properties: Theſe of the *third Order*, as they are

(*a*) § 27. (*b*) § 37. (*c*) § 29. (*d*) § 27. (*e*) Phil. tranſ. ibid. p. 326, 327.

ſmaller, ſo are they ſpecifically lighter than the preceeding, but bigger and heavier than the *Globules* of the *fourth*, or ſubſequent *Orders*, and ſo on: The *Globules* of the larger Size always having their compounding Elements more ſtraitly compacted than the ſmaller ones, whoſe Parts are not ſo ſtrongly bound to one another: So that we are to conceive the Maſs of *Blood*, as made up of a Congeries of Spherules differing in Denſity as well as Magnitude.

41. We have been able to determine the real Denſity of the *red Globules*; but how ſhall we arrive at any Knowledge of the *Globules* of the inferior *Orders*? Nature makes no Separation of them from one another out of the Animal; nor do we know by any Art, a Method of reducing them into diſtinct Parcels. But notwithſtanding theſe Diſadvantages, we are not to deſpair of coming at a Determination of this ſo ſeemingly difficult Queſtion. We have the Denſity of the Maſs of *Blood* 1045 (*a*), of the *red Globules* 1093 (*b*), and of the *Serum* 1022 (*c*); and from theſe three *Data*, we ſhall neceſſarily have a very regular and conſiſtent Series, if we reckon the Differences of Denſity between any *Order*, and its ſubſequent one, to be a third Part greater

(*a*) § 35. (*b*) § 32. (*c*) § 37.

er than the Difference between that ſubſequent one, and what immediately ſucceeds it. Thus if α, β, γ, δ, &c. be the Denſities of the *Orders* A, B, C, D, &c. then $\alpha - \beta \times \frac{2}{3}$ will be equal to $\beta - \gamma$, and $\beta - \gamma \times \frac{2}{3}$ equal to $\gamma - \delta$, and ſo on; theſe Differences of Denſities decreaſing in a Geometrical Proportion; ſo that at length the very minute *Globules* of the inferior *Orders* come all to be nearly of the ſame ſpecifick Weight. By this Rule the ſpecifick Weights of the ſeveral *Orders* of *Globules* are in the following Proportions.

The Maſs of warm *Blood*, or the *Globules* of the *firſt* and all the ſubſequent *Orders*, -	1045
Globules of the *firſt Order*, -	1093
The *Serum*, or *Globules* of the *ſecond*, and all the ſubſequent *Orders*, - - -	1022
Globules of the *ſecond Order*, -	1053
Globules of the *third* and ſubſequent *Orders*, - -	1006
Globules of the *third Order*, -	1027
Globules of the *fourth* and ſubſequent *Orders*, - -	995
Globules of the *fourth Order*, -	1009
Globules of the *fifth* and ſubſequent *Orders*, - -	988

Globules

Globules of the *fifth Order*, -	998
Globules of the *ſixth* and ſubſequent *Orders*, - -	984
Globules of the *ſixth Order*, -	990
Globules of the *ſeventh* and ſubſequent *Orders*, - -	980
Globules of the *ſeventh Order*, -	985
Globules of the *eighth* and ſubſequent *Orders*, - -	978
Globules of the *eighth Order*, -	981
Globules of the *ninth* and ſubſequent *Orders*, - -	977
Globules of the *ninth Order*, -	979
Globules of the *tenth* and ſubſequent *Orders*, - -	976
Globules of the *tenth Order*, -	977

42. We are not to wonder that the Globules of the *ſeventh*, and all the lower *Orders*, are ſpecifically lighter than Water of the ſame Degree of Heat; they take up only the eleventh Part of the Maſs of *Blood* (*a*). And the Liquors of our Bodies are all ſtored with oily light Particles, and that in greater Abundance than either with Salt or Earth (*b*); which therefore are capable to render the Parts of the Blood lighter than Water, were it not that the *vis vitæ*, conſtantly

(*a*) § 28. (*b*) § 24.

ly operating in the animal Machine, the ſanguineous Elements are wrought up and compacted together in ſuch a Way as to render all the larger-ſized *Globules* much denſer, and the whole Maſs conſiderably heavier than Water.

XI. *The Diameters, Magnitudes, Weights, &c. of the Globules of the* Blood.

43. From the Conſtruction of the *Blood* formerly deſcribed (*a*), it is plain that the Quantity of Matter of the *Globules* of any *Order* is ſixfold the Quantity of Matter of the *Globules* of the next ſucceeding *Order*; and the ſame *Ratio* would hold of their Bulk or Size, if they were all of the ſame Denſity. But by their Variety in this Reſpect, their Bulks or Magnitudes do not exactly follow this Proportion; for theſe are directly as their Quantities of Matter, and inverſely as their reſpective ſpecifick Weights. And their Diameters are as the Cube Roots of theſe Magnitudes. Thus the Magnitude of a *red Globule*, is to that of a *Globule* of the *ſecond Order* in a compound *Ratio* of 1 to $\frac{1}{6}$ directly, and 1093 to 1053 reciprocally; that is, as $\frac{1}{1093}$ to $2 \times \frac{1}{1053}$

(*a*) § 9, &c.

$\frac{1}{5} \times \frac{1}{1053}$, or as 1 to $\frac{1}{5,78}$. And their Diameters as $\sqrt[3]{1}$ to $\sqrt[3]{\frac{1}{5,78}}$, that is as 1 to $\frac{1}{1,7955}$, and so on of all the rest as in the following Table.

The Orders of Globules.	Quantities of Matter of the Globules.	Magnitudes of the Globules.	Diameters of the Globules.
1	1	1	1
2	1/6	1/5,78	1/1,795
3	1/36	1/33,83	1/3,234
4	1/216	1/199,4	1/5,842
5	1/1296	1/1182	1/10,57
6	1/7776	1/7043	1/19,17
7	1/46656	1/42033	1/34,77
8	1/279936	1/251249	1/63,1
9	1/1679616	1/1504400	1/113
10	1/10077696	1/9000000	1/208

44. These

44. Theſe are the Proportions the ſeveral *Orders* of *Globules* bear to one another: But it will be required to determine, if poſſible, their real Dimenſions compared to ſome known Magnitude. It is ſatisfying and uſeful, as well as curious, to reduce to Meaſure and Weight the ſubtile Particles of Matter. The beſt Philoſophers of all Ages have been very ſollicitous in their Enquiries about them, as being the chief Springs of the Operations of Nature. Many had aſſigned to the heavenly Bodies their proper Dimenſions; but the Great Sir *Iſaac Newton*, by an incomparable Strength of Genius, found out their real Weights, or Quantities of Matter, and, as it were, put the ſtupendous Maſſes of the Sun and Planets in the Scales; an Attempt which our Forefathers would have thought beyond the Reach of Mortals! But ſtill he is as much admired; and ſurely we are more indebted to him for his wonderful Diſcoveries concerning the inconceivably minute Particles, the Rays of Light; and the ſeveral very minute Thickneſſes of Bodies reflecting all the ſeveral ſorts of Rays of different Sizes and Orders, and producing all the various Colours in the Univerſe. And no true Philoſopher will judge it a fruitleſs or vain Undertaking to inveſtigate the real

Sizes

Sizes of the Particles or *Globules* of the *Blood*. They are a Part of our selves, and a considerable Ingredient in our very Beings.

45. Mr. *Leeuwenhoek*, who spent his Life in microscopical Observations; and in particular, very often viewed the *Blood* through his most excellent Glasses, used to reckon (*a*) the Diameter of a *red Globule* of the *first Order* to be the $\frac{1}{100}$ Part of the Diameter of a large Grain of Sand, and consequently $\frac{1}{1000000}$ Part of its Bulk. But this is somewhat too vague; he not having carefully or positively enough determined the real Diameter of such a Grain of Sand, compared to some known Measure: However we may presume he meant by it a Grain of Sand of the larger Sort, the Thickness whereof he judged to be about $\frac{1}{30}$ Part of an Inch (*b*); and consequently an Inch should be 3000 times broader than the Diameter of a red Globule. Dr. *Tabor* (*c*) computed it $\frac{1}{3600}$ of an Inch. But his Method is not capable of the desired Exactness. Dr. *Jurin* (*d*) taking a very pretty Way of investigating the true Size of very small Bodies, reckoned the Diameter of a *Globule* of *Blood* to

(*a*) Anat. & contempl. p. 35. & passim alibi.
(*b*) Ibid. p. 39.
(*c*) Exerc. med. l. 1. § 3.
(*d*) Phil. transf. 355. Abr. iv. 1. p. 444.

to be $\frac{1}{3240}$ Part of an Inch. But as this was deduced from an Obſervation, the Circumſtances of which were not ſo very accurate as one could have wiſhed, that Defect was amply ſupplied by ſome ſubſequent Obſervations carefully made by him, and then confirmed by *Leeuwenhoek* himſelf; whereby they both found the apparent Diameter of a *red Globule* to be exactly $\frac{1}{1910}$ Part of an Inch (*a*). If this Globule be ſuppoſed circulating in our Body, and heated to the ordinary Degree of living *Blood*, then indeed its Diameter will be ſomething enlarged, to wit, in the *Ratio* of $\sqrt[3]{100}$ to $\sqrt[3]{99}$ (*b*), which is nearly in the *Ratio* of 300 to 299. Whence the true Diameter of a *red Globule* in its natural State comes out $\frac{1}{1940} \times \frac{300}{299}$, or $\frac{1}{1933,5}$ Part of an Inch. In the ſame Manner the Diameter of a *Globule* of the *ſecond Order* is equal to $\frac{1}{1933,5} \times \frac{1}{1975}$, or $\frac{1}{3470,6}$ Part of an Inch: And ſo on through the other Orders, as in the following Table.

Orders

(*a*) Phil. tranſ. 377. p. 341.
(*b*) § 35.

Orders of Globules.	Diameters of the Globules in Parts of an Inch.	Orders of Globules.	Diameters of the Globules in Parts of an Inch.
1	$\frac{1}{1933,5}$	6	$\frac{1}{37065}$
2	$\frac{1}{3470,6}$	7	$\frac{1}{67228}$
3	$\frac{1}{6253}$	8	$\frac{1}{122000}$
4	$\frac{1}{11295}$	9	$\frac{1}{218500}$
5	$\frac{1}{20437}$	10	$\frac{1}{402170}$

46. Perhaps it may be worth while to obſerve, that Sir *Iſaac Newton* (*a*) has determined the Thickneſs of a Particle of Water reflecting *Scarlet* of the *ſecond Order* of Colours to be $\frac{14,75}{1000000}$ Parts or $\frac{1}{67\frac{1}{97}}$ Part of an Inch, which almoſt coincides with $\frac{1}{67\frac{1}{28}}$ Part of an Inch, the Diameter of the *Globules* of the *Blood* of the *ſeventh Order*.

47. From hence it will be eaſy to determine the real Magnitudes of the *Globules* of each of theſe *Orders*, compared to ſome known Meaſure. The Bigneſs, for Example, of

(*a*) Opticks ii. 2. p. 206.

of a *Globule* of the *first Order* is to a Sphere of an Inch diameter, in the triplicate *Ratio* of 1 to 1933 $\frac{1}{2}$, which is as 1 to 7228240000. And the Bigness of the other *Globules* are readily found in the same Way.

48. A Sphere of Water of an Inch diameter was observed (*a*) to weigh *gr.* 132 $\frac{2}{3}$; and therefore a Sphere of Matter of the same Density with the *red Globules* of *Blood*, should weigh *gr.* 132 $\frac{2}{3} \times \frac{1093}{1000} = gr.$ 144,986, consequently a Grain should be able to counterpoise $\frac{7228240000}{144,986}$ or 49854600; that is, near fifty Millions sanguineous *Globules* of the *first Order*. What a prodigious Minuteness does this seem to be! And yet these are the biggest Particles that naturally exist in the circulating Fluids of the human Body; and immensely bigger than the lesser-sized *Globules*: And all of them are again to be conceived as made up still of minuter Particles, and Elements of different Kinds.

Thou hast ordered all Things in Measure and Number and Weight. I will praise thee, [O God,] *for I am fearfully and wonderfully made: Marvellous are thy Works, and that my Soul knoweth right well.* Wisd. xi. 20. and Psal. cxxxix. 14.

(*a*) § 36.

VIII. *The Experiment of cutting the Recurrent Nerves carried on farther than has hitherto been done. In a Letter from Dr.* GEORGE MARTIN, *Physician at St.* Andrews, *to Mr.* Monro *Professor of Anatomy at* Edinburgh, *by whom it was communicated.*

THE Moderns have acquired a much exacter Knowledge of the Structure of the human Body than the Ancients could possibly come at. We have the Advantage of the Time and Pains they laid out in making their Observations; and beside, can boast of many Opportunities they were entirely destitute of. Yet we cannot but admire these great Men, if we will form a Judgment of them from the Monuments of their Genius and Industry they left behind them, though some of these are lost, and many of them, though preserved in Books, are sometimes too much slighted by the over negligent Possessors of these Treasures.

2. The first Physicians had but a very faint Notion of the Brain presiding over the Animal System by the Mediation of the spinal

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Fig. 1.

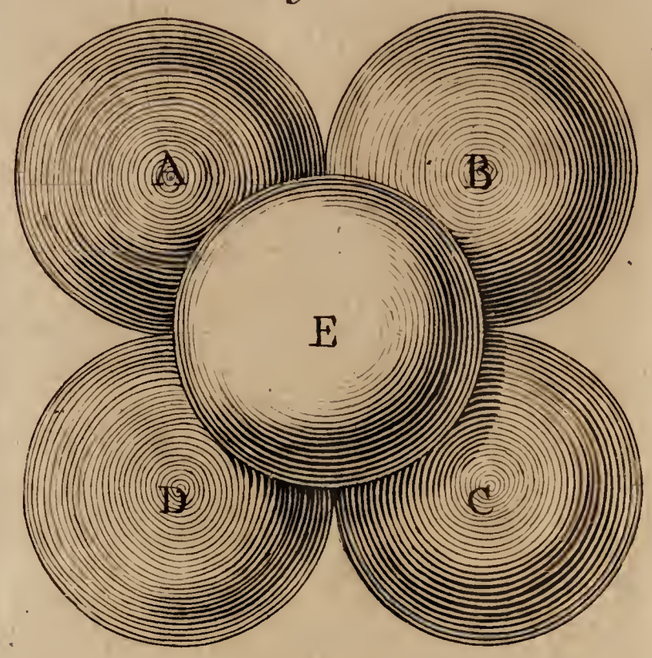


Fig. 3.

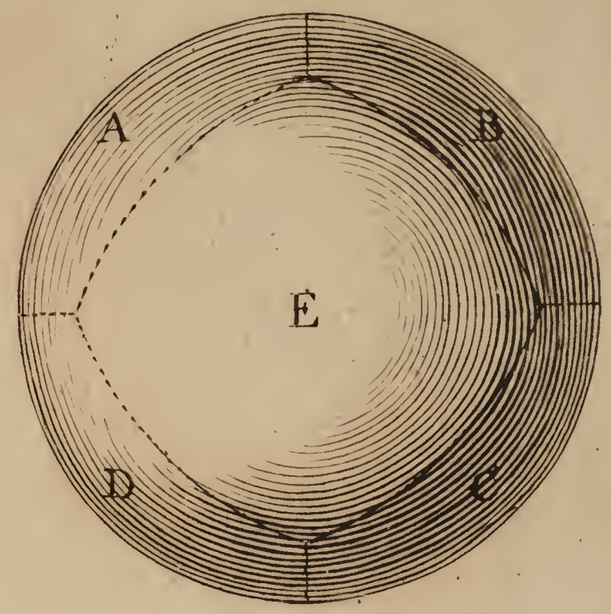


Fig. 2.

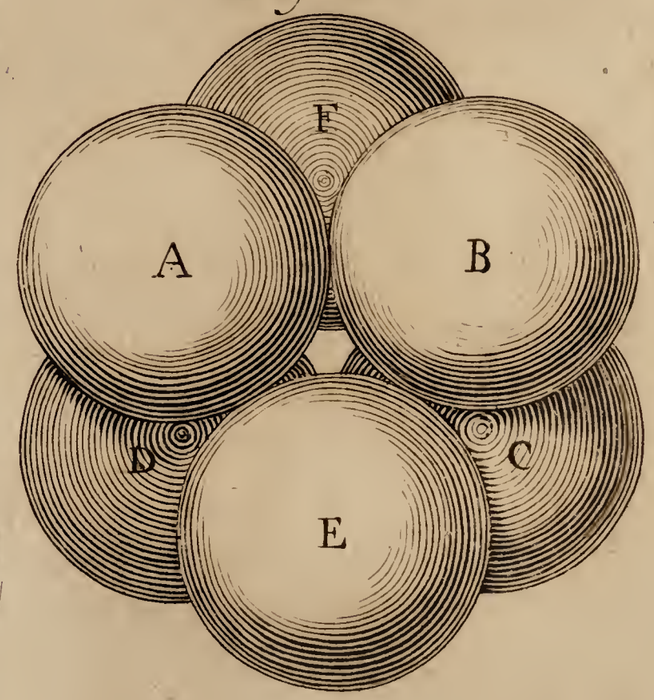


Fig. 4 F

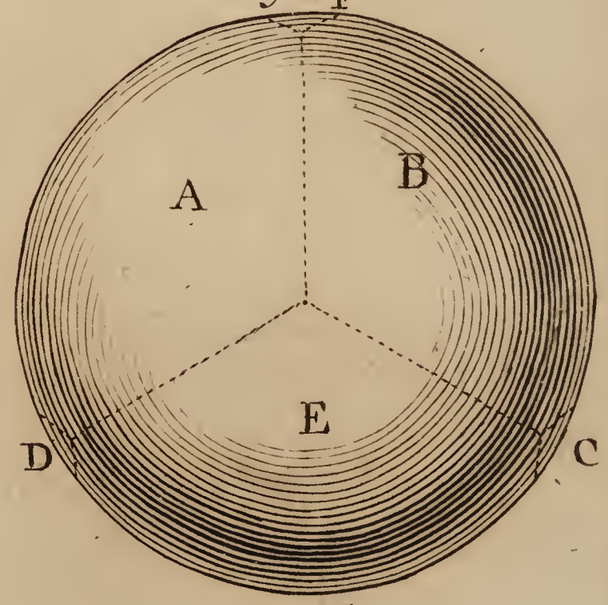
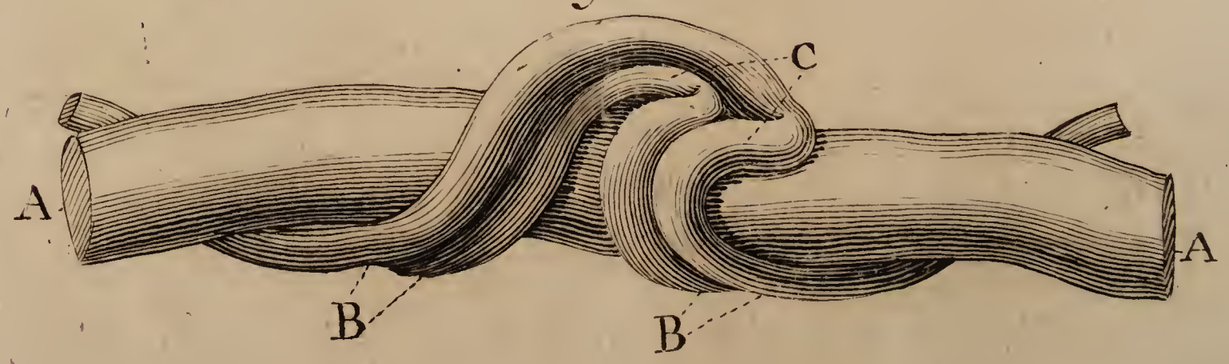


Fig 5.



R. Cooper fecit

ſpinal Marrow and Nerves produced from it, and diſtributed to the reſt of the Body. And we muſt acknowledge this was not ſufficiently underſtood before *Herophilus* and *Eraſiſtratus*, the greateſt Anatomiſts of Antiquity, who explained this Scheme, and left the World no Room to doubt of this elegant Piece of Mechaniſm of the animal Body. Phyſicians began to diſſect with more than ordinary Care both living and dead Animals; and they ſoon found, that by cutting, tying or compreſſing any Nerve, or any other Way intercepting its Communication with the Brain, the Parts to which it belonged were immediately deprived of all Senſe and Motion.

3. It was eaſy to confirm this Doctrine by Experiments on any of the ordinary Nerves. But one of the prettieſt Inſtances of it, was the making Ligatures upon the Veſſels at the Side of the Wind-pipe, and immediately ſtricking the Animal dumb, however noiſy it was before. The firſt Makers of this Experiment thought the Animal turned comatous, or fell aſleep; and aſcribing this Effect to the intercepting any Paſſage of vital Blood from the Heart to the Brain, by the Way of the Arteries; they gave theſe Blood Veſſels the Name of *Carotids*, καροτιδῶν. But in the

Days of *Ruffus* (*a*), this ſudden Silence of the Animal was found to proceed from the tying of the adjacent Nerves. And *Galen*, who ſeems to have laboured this Affair more than any of his Predeceſſors, evidently proved (*b*), That tying the Arteries ſoley produced little Change on the Animal. In this Caſe, (laying aſide the captious Caviis and Oppoſitions of *Hoffman*, *Vanderlinden*, *Wepfer*, and others of the Moderns, who diſputed againſt the Experiment, which however eaſy, they would not take the Trouble to repeat) we muſt conceive the Brain to have been furniſhed by the vertebral Arteries. And ſo he found all that the Animal ſuffered in the Experiment of tying the whole Veſſels at the Side of the *Trachea*, to be a ſudden Obmuteſcence; which entirely proceeded from the intercepting the nervous Influence on the Muſcles of the *Larynx:* for he diſcovered (*c*) that theſe Nerves were derived from the *Par vagum*; and that they, making a Turn under the right ſubclavian Artery, and deſcending *Aorta*, climbed up along each Side of the Wind-pipe, to furniſh theſe Muſcles.

4. The Oddneſs and Novelty of all this Doctrine

(*a*) De app. part. i. 34.
(*b*) De decr. Hipp. &c. ii. 6. De util. reſp. v.
(*c*) De uſ. part. vii. 14. xvi. 4. De loc. affect. i. 7.

Doctrine, was in thoſe Days ſurpriſing (*a*). The *Virtuoſi* at *Rome* knew nothing of it; yea *Alexander* of *Damaſcus*, the *Peripatetick* and Preceptor of *Boethius*, was reſolved to deny and oppoſe it at any rate. He would rather reſiſt the Evidence of Senſe, than yield any thing that might contribute to the riſing Glory of *Galen* his Rival. But our Anatomiſt, in the midſt of a learned and judicious Aſſembly, conſiſting of Adverſaries as well as Friends, by ocular Demonſtration, gave them at once a convincing Proof of the Truth of his Doctrine, and of his own extraordinary Skill in Diſſections. Yea this was confirmed by ſome caſual Obſervations made on ſome of our own Species (*b*). An unlucky ſcrophulous Boy falling into the Hands of an ignorant Surgeon, loſt the half of the Strength of his Voice, by having one of the Recurrent Nerves cut along with the Tumour. However he eſcaped better than another Boy, who in the like Caſe was indeed cured of the *Strumæ*; but, having both the Recurrents extirpated, was left quite dumb.

5. This Experiment of cutting theſe Nerves in brute Animals, was repeated and con-

(*a*) De præcog. ad poſthum. v.
(*b*) Galen. de loc. affect. i. 7.

confirmed by *Veſalius* (*a*), otherwiſe, you know, no great Favourer of the Doctrines or Glory of *Galen*. And I my ſelf about twelve or thirteen Years ago, when I was firſt ſetting out to make ſuch Experiments, trying it in a Pig, with all the Circumſpection I was then capable of, found it to anſwer exactly. So that though this elegant Operation has been much out of Uſe among the Moderns, inſomuch that one might have ſuſpected it had been given over for want of Succeſs, yet, however grea Regard I have to your Judgment and great Skill in Anatomy, I could not conſent to you, when, from a pre-conceived Theory you ſeem to think (*b*) *it probable the Voice would not be entirely loſt, tho' both the recurrent Nerves were cut, ſo long as the ſuperior Branches ſtill ſupply the* Larynx. It is true that *Galen* (*c*) himſelf taught that there was on each Side an Inoſculation of the Extremity of the Recurrent, with one of the ſuperior Branches of the eighth Nerve. This was copied by *Nic. Maſſa*, painted by *Euſtachio*, and confirmed by *Willis* and the Moderns: But ſtill, on Diſſection, I could not find that there was

(*a*) Hum. corp. fab. vii. 19. p. 571.
(*b*) Of the Nerves, p. 19.
(*c*) De uſ. part. xvi. 4.

was any regular Diſtribution of Nerves to the proper Muſcles of the *Larynx*, from any other Origin beſide the Recurrents. This you know I gueſſed to be the Caſe: And now I find it to be true in Fact.

6. It is plain then, That the Voice muſt be loſt, however ſound and free we ſuppoſe the ſuperior Branches of the *Par vagum*. But ſtill there is ſome hankering Doubt in this Affair; and it is propoſed to try this over again, and keep the Animal alive ſome Weeks, to ſee if the Voice would at all return. We know not of any of the Ancients carrying on the Experiment thus far; except we ſay *Galen*'s ſcrophulous Boys ſhow the abſolute Irrecoverableneſs of the Voice. But to put the Matter beyond all Doubt, I repeated the Experiment this Spring on a young Sow five or ſix Weeks old, ſome Days before it was weaned from ſucking, and took greater Notice of all the Circumſtances than I had done formerly. I could obſerve with the Ancients; and ſo did two curious young Gentlemen who aſſiſted me, that upon cutting the Nerve on one Side, the Voice was not deſtroyed, only it became weaker; but upon cutting the other, it was entirely loſt, though, by the Sound of the Breath, and the Motion of the *Thorax*, you would manifeſtly have ſeen a

fruitleſs *Conatus*, and the Creature ſtraining to make a Noiſe. And ſo I very well underſtood *Veſalius*, when he ſays, *Pulchrè auditur quàm validam efflationem animal citra vocem moliatur, recurrentibus nervis cultello diviſis.* The Creature, when diſmiſſed, ſeemed well enough, ſucked the Mother for ſome Days, lived with the reſt of the Litter ſeemingly hearty and well, though always dumb. It could indeed make ſome little, juſt audible, grunting Noiſe, but could never give a Squeak in the ordinary Manner of theſe Animals. From the Beginning it breathed as if the *Glottis* were too wide, eſpecially in the Heat of the Day. And this Difficulty in ſome Weeks began to encreaſe upon it; ſo that in Proceſs of Time it became more lazy and ſolitary, frequently retired to the Shade by it ſelf; by Degrees loſt its Strength and Appetite, pined away, and at length in about ſix or ſeven Weeks died. Upon inſpecting the *Larynx*, I could not ſay it had undergone any great or remarkable Change. The Orifices of the Ventricles ſeemed, I thought, laxer, and a little above them the Membrane of the *Glottis* was ſomewhat inflamed on each Side.

7. The Ancients knew, That the Noiſe of the Voice depended on a due Narrowneſs of

of the Aperture of the *Glottis*. And the Author of the Book *de voce & anhelitu* (*a*), aſcribed to *Galen*, expreſly affirms, *Si inſtrumenta vocis ampliſſima eſſent, tunc vox deſtrueretur*: So that on the cutting the Recurrent Nerves, we are to conceive the *Glottis* to ſtand open, and not to be ſhut at the Pleaſure of the Animal. And what elſe indeed can we expect, when the nervous Influence on the Muſcles belonging to the *Arytænoid* Cartilages is taken away in ſuch a Manner that they can never be brought to a due Conſtriction, nor the Ventricles of the *Larynx* ſuffer any Variety of Contraction and Dilatation.

(*a*) Tract. iii. p. 63.

IX. *An ESSAY on the* Nutrition of Fœtuſes, *by* Alexr. Monro *Profeſſor of Anatomy in the Univerſity of* Edinburgh, *and* F. R. S. *Vid. Vol. 3. p. 269, &c.*

While our Senſes and Judgment are in the preſent imperfect State, it is no Wonder that Men ſhould differ ſo widely in their Opinions of Things, and in the Conſequences they draw from the Appearances

ances in Nature. Such is the Caſe at preſent between my ingenious valuable Friend Mr. *Gibſon* and me. He has given a learned critical Account of the different Opinions concerning the *Nouriſhment of Fœtuſes* in *Art.* XIII. of your firſt Volume, where after examining the Arguments made uſe of for proving their Nouriſhment to be conveyed by the Navel only, he concludes them to be inſufficient, and ſupports the Doctrine of the Aliment being received by both the Mouth and Navel. I formerly wrote Mr. *Cheſelden*, and he publiſhed ſome Facts, ſerving principally for proving the Negative of a *Fœtus* taking its Food at the Mouth; ſo that Mr. *Gibſon* very juſtly names me as one of thoſe who differ in Opinion from him, which I cannot help doing ſtill; and therefore believe my ſelf engaged to give my Reaſons of Diſſent; ſince there is no Certainty that Dr. *Bellinger*, whom he more directly attacks, either has ſeen, or will anſwer my Friend's Eſſay.

The Work you are engaged in does not ſeem to admit of numerous Defences, Replies, *&c.* which ſometimes Diſputes are liable to run into; and you have given a ſtrong Caution to your Correſpondents to beware of indecent Expreſſions. I hope both theſe Inconveniencies will be prevent-

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ed here; for Mr. *Gibſon* has already mentioned the moſt material Arguments made uſe of to ſupport the Doctrine he favours; and I ſhall faithfully repreſent any other Reaſons furniſhed by Books, or my own Reflexions, which favour his Side of the Queſtion; and therefore Replies will be at leaſt ſhorter, if not unneceſſary; and this way of managing the Diſpute will ſhew you that there is no great Anxiety on my Part to bring People at any rate into my Way of Thinking; and I dare promiſe on Mr. *Gibſon*'s Behalf, that he will not value a Victory in point of Argument near ſo much, as he would be ſatisfied to ſee the Truth aſcertained by our Labours, tho' Judgment ſhould be given againſt him. In ſhort, Gentlemen, our Caſe is that of two Friends differing in Opinion in an Enquiry after Truth, and not being able to convince each other, are willing to appeal to better Judges, that they may determine who has the greateſt Probability on his Side, without believing our Honours at Stake, which ever Way Sentence is given.

I ſhall paſs without any Examination *Alcmæon*'s Opinion of the *Fœtus* receiving its Nouriſhment by the Pores or Veſſels on the Surface of its Body, while it is a forming; both becauſe there are no Experiments

ments for proving whether the Veins there take in more at this Time, than the Arteries throw out; and that it is not the Subject of the preſent Queſtion, which only concerns the *Fœtus* after it is form'd; whoſe Nouriſhment is now allowed by all, either to paſs from the *Amnios* by the Mouth into its chylopoietick Organs; or to be conveyed into its Blood-veſſels, by means of the umbilical Veſſels; or to be furniſhd by both. I maintain the ſecond of theſe Opinions, and therefore endeavour to render the other two improbable; by which you ſee I am under the Diſadvantage of ſupporting a negative Proof.

The Determination of the Queſtion, as now ſtated, may be reduced to the Solution of the few following Problems.

I. *How far the Mouth, or umbilical Veſſels are neceſſary to the Nouriſhment of* Fœtuſes.

II. *Whether the Liquor of the* Amnios *is proper Food for a* Fœtus.

III. *Whether this Liquor paſſes into the Stomach of a* Fœtus.

In this Paper I ſhall only conſider theſe Pro-

Problems, so far as they relate to viviparous Animals, and shall soon send you a Sequel to it, wherein I shall examine, *How far the Analogy of oviparous Animals, and of Plants serves to explain or confirm the Solutions, which I give here to the foregoing Problems.*

In treating this Subject, I must beg leave to throw away that humble Regard to Authority, which bore sovereign Sway in the Schools of Physick so long, and to pass all the hypothetical Reasonings to be met with in Books unmentioned. It is only well vouched Facts, and reasonable Consequences from them, that I will take any notice of; for on these, and these only it is, that a rational Foundation of any Part of Medicine can be laid. The first Thing therefore which I shall do, is to set down such Facts as I may have occasion to assume in my subsequent Reasoning, together with some others, serving either to confirm and establish those, or to render them more clear and intelligible; tho' few of them are new, yet most of them are neglected in the common Books of Anatomy, and no Author of my Acquaintance has collected them.

That the Truth of these Facts may be more unquestionable, I shall either point out the Manner in which others may observe

ſerve them; or where I had not the Opportunity of an exact enough Examination my ſelf, I ſhall quote my Vouchers, who are Authors of the beſt Characters for Knowledge and Candour: And if I affirm at any Time the Being or Structure of Things that are not demonſtrable to the Sight, I ſhall ſet down other Facts from which they ſeem to be plainly and neceſſarily concluded to be true. But becauſe my Deſign confines me from entring into very particular minute Deſcriptions, I generally refer to Books where ſuch Deſcriptions are to be had, ſo that thoſe who deſire to be more fully inſtructed, may know where to be informed; and others who do not incline to give themſelves any further Trouble, may believe as well as they pleaſe of my Honeſty, and will meet with no great Interruption in reading, by the ſmall Mark of a Reference to the Quotations.

The preliminary Facts.

1. The human *Uterus* has numerous Orifices of Veſſels opening into its Cavities to pour out Liquors there (*a*).

Theſe Liquors may at any Time be ſeen ouzing

(*a*) Tho. Bartholin. anat. reform. lib. i. cap. 28. Santorin. obſerv. anat. cap. xi. § 11.

ouzing out, by gently preſſing the Subſtance of an opened *Uterus*.

2. TOWARDS the *Fundus* of the Womb eſpecially, theſe Orifices are found to be the Extremities of Canals that come out from larger Cavities lodged within the Subſtance of the Womb; theſe Cavities are commonly called *Sinuſes* (*a*).

3. THE *Sinuſes* are much of the ſame Texture with the Cells of the Spleen, or rather of the *corpora cavernoſa penis*, being membranous Cavities communicating with each other, and having numerous Arteries ſpread on them, whoſe lateral Branches open into the Cells, from which Veins go out to be joined to other Veins, that return the Blood from the other Parts of the Womb (*b*.)

4. THESE Sinuſes are diſtended with Blood in the Time of the Menſes, when their Orifices alſo are enlarged (*c*).

I have ſeen this in ſeveral Women I diſſected.

5. DURING the Time of Pregnancy, the Sinuſes and their Canals that open into the

(*a*) Bartholin. anat. reform. lib. i. cap. 28. Morgagn. Adverſ. anat. iv. animad. 26. 27.

(*b*) Malpigh. in Epiſt. ad Spon. Littre in memoirs de l'Acad. des Sciences, 1701.

(*c*) Bartholin. Anat. ref. lib. 1. cap. 28. Morgagn. Adverſ. anat. 1. § 33. Adv. 4. § 27.

the Womb, are gradually distended and inlarged.

In a Woman who died three or four Months gone with Child, I saw the Orifices of these Canals large enough to receive a Goose Quill, the Sinuses being considerably larger. At the End of nine Months the Sinuses will contain the Point of the largest Finger (*a*); and the Canals from them will receive the little Finger (*b*).

6. BESIDES the reticular Bundles of muscular Fibres, which enter into the Structure of the Womb (*c*), I have seen *Ruysch*'s orbicular Muscle at its *Fundus* (*d*).

7. THE *Placenta* generally adheres to, or near to the *Fundus* of the Womb.

All agree in this. In two Women with Child, whom I had occasion to open, the *Placenta* adhered principally to the anterior Part of the *Fundus*.

8. THE *Placenta* is covered on the Side next to the Womb, with a fine membranous Continuation of the *Chorion* (*e*).

I saw this distinctly in both the Subjects I dissected.

9. THE

(*a*) Santorin. Observ. anat. cap. xi. § 9. Morgagn. Adv. anat. 4. §. 26.

(*b*) Morgagn ibid.

(*c*) Malpigh. in Epist. ad Spon.

(*d*) Ruysch. Epist. de musc. in fundo uteri.

(*e*) Ruysch. Thes. anat. 11. Asser. 4. n. 18. not. 1. & Thes. 5. n. 41. Santorin. Observ. anat. cap. xi. §. 11.

9. The Extremities of the umbilical Veſſels pierce this Membrane, and ſhew their very ſmall Orifices on its Side next to the *Uterus*; and therefore it is compared to the villous Coat of the Inteſtines (*a*).

10. The *Allantois* was carefully ſought for in both the Subjects I opened; but we could ſee no ſuch Cavity, or Liquor in it. The Membranes had a looſe Connection, by a cellular Subſtance, and a fine tranſparent Membrane was obſerved between the *Chorion* and *Amnios*.

11. The *Uteri* of other Animals have Veſſels opening into their Cavities, as well as the human Womb, and the ſame Trial diſcovers them.

12. The membranous Continuation of the *Chorion* has not yet been diſcovered on the exterior Surface of the *Placentæ* of Brutes; but their Secundines have numerous Orifices of the umbilical Veſſels opening on their Surface next to the *Uterus*, as is evidently demonſtrated, by injecting a thin Liquor into the umbilical Vein or Arteries; for it ſoon comes running out every where from the exterior Surface of the *Placenta* and *Chorion*.

13. The Mother ſupplies Liquors to the

(*a*) Ruyſch. Theſ. 5. n. 41. Rouhault Memoires de l'Acad. des ſciences, 1714 & 1716.

Fœtus, which returns others to the Mother by means of the uterine and umbilical Veſſels.

This ſeems to be plainly proved by Obſervations. *Fœtuſes* whoſe *Placentæ* were not in the leaſt ſeparated from the *Uterus*, have been quite exhauſted of Blood by the Mother's dying of a Hæmorrhagy (*a*). And I have ſeen Children pale and weak, by violent Flooding in the Time of Labour.

14. When a *Fœtus* dies, or is ſeparated from its Secundines by cutting the umbilical Rope, the Circulation of Liquors is wholly ſtopped in the Veſſels of the Secundines, and theſe become a lifeleſs Maſs.

The Experience of our greateſt Practiſers in Midwifery ſufficiently proves this. They tell us that no Hæmorrhagy or Diſcharge of any other Liquor happens at the umbilical Veſſels, upon the Navelſtring's being cut or broke, after the Veſſels are ſecured on the Side of the Child, as I have alſo ſeen frequently; and another Proof is, the *Placentæ* commonly ſeparating in a ſhrivelled or ſuppurated State, ſoon after the Communication with the Child is deſtroyed (*b*).

When

(*a*) Mery dans l'hiſt. de l'Acad. des ſciences, 1708. Heiſter compend. anat. not. 36.

(*b*) Mauriceau maladies des femmes groſſes, liv. ii. chap. 9. Ruyſch. in Theſ. obſerv. & adverſ.

When one is to obſerve whether the umbilical Veſſels have a Circulation of Blood kept up in them, after their Communication with the Child is ſtopped or deſtroyed, he needs ſcarce be deſired not to miſtake a few Drops of Blood, ſuch as would come from an amputated Limb of a dead Perſon, for a Hæmorrhagy; but he ought to obſerve one Caution, which is to make ſure before the Trial, that there is no *Fœtus* left with its Navel-ſtring untied or uncut: For in the Caſe of Twins, when often the *Placentæ* are blended, and ſometimes one Navel-ſtring ſerves both (*a*); though one Child is taken away, the other may fill the Veſſels of the *Placentæ*, and continue their Functions; ſo that a Hæmorrhagy would happen at the cut but untied Navel-ſtring of the firſt Child. We have an Inſtance of a Mother and Child being almoſt wholly drained of their Blood, by the Midwife's neglecting to ty the Navel-ſtring of the firſt of the Twins, which was brought forth without perceiving that the other ſtill remained in the Womb (*b*). This Caſe ought to be added to the Hiſtories brought in Proof of § 13.

(*a*) Mem. de l'Acad. des ſciences, 1720. Act. medic. Berolin. Dec. 2. Vol. vi. § 4.

(*b*) Hiſtoire de l'Acad. des ſciences, 1727.

15. THAT Power which Phyſicians generally now-a-days call *Abſorption*, whereby the ſmall open Orifices of Veſſels imbibe Liquors lodged in the Cavities of the Body, is obſerved to increaſe or diminiſh proportionally to the Strength or Weakneſs of the Creature.

In Diſeaſes where the Contraction of the Veſſels is too great, as in moſt of thoſe that are called acute, there is ſcarce as much Moiſture in the Cavities or Interſtices of the Parts, as allows them to ſlide eaſily one upon another. In Health the Quantity of ſuch Liquors is moderate, and a pretty conſtant Equality is kept between the Action of the Exhalants and of the Abſorbents. But when the Body turns weak, the Exhalants pour out ſo much more than the Abſorbents can take in; that all the Cavities are found to contain conſiderable Quantities of Liquors. After Dea... the Action of the Abſorbents ſeldom or never can be ſupplied by any mechanical Preſſure. For Examples of what has been ſaid concerning Abſorption, conſider the common *Phænomena* which are to be obſerved in the long alimentary Tube, in the large Cavities of the *Abdomen*, *Thorax*, *Pericardium*, &c. and in the ſmaller Cavities of the *Tunica cellularis* every where, of the *Cornea*,

nea, &c. both in a ſound and morbid State.

Hence we may underſtand how Purgatives or Diureticks may ſerve to drain off extravaſated hydropick Waters, by ſtimulating the Veſſels to a ſtronger Abſorption, and how Corroborants may produce the like Effect, though more ſlowly.

16. THE Liquors (§ 13.) are not carried from the Mother to the *Fœtus*, or from the *Fœtus* to the Mother by continued Canals, that is, the uterine Arteries and Veins do not anaſtomoſe with the Veins and Arteries of the Secundines (*a*); but the Extremities of the umbilical Vein take up the Liquors by Abſorption in the ſame Way as the lacteal Veſſels do in the Guts; and the umbilical Arteries pour their Liquors into the large Cavities of the Sinuſes, or other Cavities analogous to them.

Were I allowed to illuſtrate the Communication between a Mother and her Child in the Womb, by a groſs Compariſon, I would ſay that the uterine Sinuſes are to a *Fœtus* what the Inteſtines are to an Adult. The uterine Blood poured into the Sinuſes being analogous to the recent *Ingeſta* of Food and Drink: The Liquors ſent from

(*a*) Harvey de generat. animal. exercit. 70. Ruyſch. Theſ. v. n. 41.

the umbilical Arteries to be mixed with the uterine Blood, reſemble the Bile, pancreatick Juice, and the other Liquors ſeparated from the Maſs of Blood: The umbilical Veins, and thoſe on the Surface of the *Chorion*, take up the finer Parts of this compound Maſs, as the lacteal and meſeraick Veins do from the Contents of the Guts. And the groſſer Parts of the Blood in the Sinuſes are carried back by the Veins of the Womb, as the Excrements of the Guts are diſcharged at the *Anus*.

It is plain from the diſproportionate Size of the human Sinuſes, and of their excretory Canals, to the very ſmall extreme umbilical Veſſels (compare § 5 and 9,) that there can be no Anaſtomoſis by continued Canals ſuppoſed here, which alſo ſeems to be proved next to a Demonſtration by § 14; for if the Veſſels of the Secundines anaſtomoſed, a Hæmorrhagy or Flux of ſome Liquors would happen at the umbilical Vein, when ever the Navel-ſtring was broke or cut, and would continue as long as the After-burthen adhered to the *Uterus*; and if the umbilical Veſſels were tied, the Circulation would ſtill continue in the *Placenta*, and it would not become a lifeleſs Maſs; but the Reverſe of all theſe are obſerved, which makes a moſt ſure Proof of the

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Communication of the *Placenta* with the *Uterus* being deſtroyed as ſoon as the Navel-ſtring is divided; and as § 14 ſhews the Secundines to owe their Life and Action to the *Fœtus*, ſo the Reaſon of their taking in no Fluids, after it is ſeparated, is evident from § 15.

In Brutes we can obſerve no tearing or breaking of Veſſels, when we ſeparate the *Placentæ* from their *Uteri*; and when any Liquor is injected into their uterine Arteries, none of it does paſs into the umbilical Veſſels, as I have many Times fully tried in the glanduliferous Animals, Cows, Sheep, *&c.* and in ſome others. In many Animals the Secundines and *Uterus* do not adhere for a conſiderable Time (*a*); and in ſome of theſe, Mares for inſtance (*b*), there is no Way for any Nouriſhment to be conveyed to the *Fœtus*, except by the Veſſels of the Secundines, which therefore can only take up their Liquors by Abſorption; and why may not the ſame obtain in other Animals?

'Tis worth while to remark by the Way the Inconveniencies that are ſhunned by the Want of an Anaſtomoſis between the

(*a*) Fabric. ab Aquapend. de form. fœt. Part. i. cap. 3. Needham. obſ. anat. cap. 2.

(*b*) Needham. ibid. & cap. 3.

Veſſels of the Womb and Secundines. The Violence of the Mother's circulating Fluids is not in hazard of deſtroying the *Embryo*, while tender; and there are no Veſſels to be broken or torn at Birth, which would have required too much Force in bringing away the *Placenta*, and would have brought on Inflammation, Suppuration, and other bad Symptoms.

Some Gentlemen who contend for an Anaſtomoſis are ſo ſenſible of theſe Inconveniencies, that to ſhun having them objected to them, they will not allow the anaſtomoſing Canals to be of one continued Subſtance, but ſuppoſe the Veſſels of the *Uterus* and Secundines to be joined only *per appoſitionem*, which they explain to be, by the one Sort receiving the other ſome Way within them, in the ſame manner as the ſecond Sort of Pipes receive the firſt in the injecting Inſtruments (*a*); ſo that the Coats of the Veſſels being thus contiguous, they may ſerve for the Tranſmiſſion of Liquors, as well as if they were of the ſame continued Subſtance, and may be ſeparated with a ſmall Force, and without any Laceration.

This Suppoſition takes off indeed the Ob-

(*a*) See Art. IX. of the firſt Vol.

Objection of ſuch Inconveniencies, but is itſelf equally deſtroyed with the former, by the other Arguments uſed againſt the Anaſtomoſis or Propulſion of Liquors from the Mother, into the Branches of the umbilical Vein; and, at the ſame Time, expoſes the Propoſers of it to ſtill greater Difficulties. They muſt ſhew that the Sizes of the oppoſite Veſſels are fitted for ſuch an *intus-ſuſceptio*; whereas the Diſproportions of the human are moſt conſpicuous; and in other Creatures, the Chances of Unfitneſs are much greater than thoſe of their being rightly adapted to each other. They muſt name ſome other Inſtance of any thing like this being obſerved any where elſe in a ſound Creature. If they take a morbid Caſe, ſuch as the Cure of Wounds by *Symphyſis*, to illuſtrate their Doctrine by, they would do well to conſider how ſoon the Change from contiguous to continued Veſſels is made there.

Were it not to prevent any good Grounds for a Reply, I would leave the Doctrine I have advanced, to be maintained by the Arguments already uſed; but I know there are ſome particular Obſervations or Experiments which may be inſiſted on as clear Evidence againſt me, if I do not take off their Force; and therefore allow me to

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ſtate ſuch Objections with their Anſwers.

Mr. *Mery* (*a*) deſcribes a Child that had no Heart, Lungs, *&c.* nor nothing analogous to a Heart; and therefore cannot conceive any other Force that could continue the Circulation of the Blood in this Monſter than the Motion it acquired from the uterine Arteries, which, according to him, muſt have inoſculated with the placentary Veſſels, that the Liquors might be propelled through theſe.

Mr. *Mery* has deſtroyed the Neceſſity of his own Suppoſition in the Relation of the Fact; for he tells us, That this Monſter was Twin to a perfect Child, whoſe *Funis umbilicalis* ſent off the ſmall Navel-ſtring of the Monſter; and therefore the Heart of the complete Child would drive forwards the Blood of the Monſter, at the ſame Time that it promoted its own Circulation, without any Neceſſity of Aſſiſtance from the Mother's Blood.

Mr. *Cowper* is ſometimes quoted alſo for ſupporting the contrary of what I have aſſerted: His Words are (*b*): "Theſe Blood-"veſſels of the *Uterus* are inoſculated with "thoſe of the *Placenta*, as may appear "by the paſſing of Mercury from one to "the

(*a*) Mem. de l'Acad. des ſciences, 1720.
(*b*) Anatomy of human Bodies, Explic. of Tab. 54. F. F. F.

" the other; ſo that if you pour it into the " hypogaſtrick Arteries of the Mother, it " will paſs into the Veins of the *Placenta*, " as well as thoſe of the *Uterus:* And on " the contrary, from the Arteries of the " *Placenta* to the hypogaſtrick Veins of " the Mother; as alſo into the Veins of " the *Placenta*. Hence it appears there " is a Circulation of Blood between the " Mother and *Fœtus*; and it ſeems as if " the Blood-veſſels of both did germinate " and inoſculate with each other. But this " requires too much Speculation for my " Occaſions to admit of a further Enquiry " at preſent."

I imagine that every one who reads the preceding Paragraph, eſpecially if he is at all acquainted with Mr. *Cowper*'s Manner of telling what he has ſeen, will readily judge that this Author is there aſſerting rather *à priori* what he thinks would happen, than deſcribing what he really ſaw upon Trial. Obſerve only how dubious and timorous his Words are, " *The Inoſcula-* " *tion may appear by pouring in Mercu-* " *ry.*— *It ſeems as if the Blood-veſſels* " *of both did germinate and inoſculate.*— " *This requires too much Speculation to* " *admit of a further Enquiry at preſent.*" If he had made the Experiment, he would have

have told us that he had poured in Mercury, and after ſeeing it paſs in ſuch a manner, was certain ſuch an Inoſculation did obtain. So that I would believe the Reaſons already given againſt an Inoſculation, are at leaſt ſufficient to counter-balance what Mr. *Cowper* has ſaid. But to take away all Pretence for inſiſting on this Aſſertion of his as a concluſive Experiment, I injected Oil of Turpentine into the Iliac Artery of a Woman three or four Months gone with Child, on purpoſe to examine this Fact. The Return of the Oil by the Artery of the other Side, or by the Veins was prevented, and I puſhed in the Oil, till the *Uterus* was ſo greatly ſwelled, that the Veſſels ſeemed to be in hazard of burſting, and the Gentlemen who aſſiſted me were of Opinion that a ſufficient Quantity was thrown in for determining the Fact. When we opened the *Uterus*, the umbilical Veſſels were found empty, and we neither ſaw any Particles of Oil, nor could be ſenſible of its Taſte in the Pieces of coagulated Blood, ſcattered here and there in the Vein. Mr. *Gibſon* indeed thought he ſmell'd the Oil in this Blood, but Dr. *John Taylor*, Fellow of the College of Phyſicians in this Place, and the Students of Phyſick who were preſent, joined with me in being ſenſible

ſible of no ſuch ſmell. None of us could obſerve one Drop of the Oil, or any Smell or Taſte of it in any Part of the *Fœtus*. From the whole I flatter my ſelf, that I have given ſufficient Grounds for denying ſuch a vague Aſſertion as Mr. *Cowper*'s ſeems to be.

Mangetus (*a*) has recorded a much more expreſs Experiment, which he ſays *Vieuſſens* communicated to him. It is this, "Quick-ſilver, injected into the carotid "Artery of a Bitch with Young, not on-"ly ran into all her Members and Bowels, "but likewiſe came ſo by the umbilical "Vein into the Whelps incloſed in the *U-*"*terus*, that their interior and external "Parts, and conſequently the whole Skin, "were prettily painted with this Mercury "running through the Blood-veſſels."

If this Experiment had been related by Mr. *Vieuſſens* himſelf, I ſhould have paid much more Regard to it, than in the Way it is now publiſhed; for *Morgagni* (*b*) has ſufficiently ſhewn how intolerably inaccurate *Mangetus* has been through the whole great Work where this Experiment is publiſhed; and Mr. *Vieuſſens* has mentioned nothing of it, when he expreſly treated this very

(*a*) Theat. Anat. lib. 2. pars 2. cap. 3.
(*b*) Adverſ. Anat.

very Queſtion (*a*): Which made me to doubt the Truth of it; and therefore I repeated it, with the Aſſiſtance of my Colleague Dr. *Andrew Sinclair*, Profeſſor of Medicine, and of Mr. *Gibſon*, in Preſence of ſeveral young Gentlemen. We put a Pipe into the carotid Artery, without cutting more of the Teguments than was neceſſary to come at the Artery; then hang'd up the Bitch by the Neck, and poured in the Quick-ſilver. We choſe this Method, to prevent the Mercury from running out at cut Veſſels, and that it might force its Way further into the uterine Veſſels, when it was thus preſſed by ſuch a high Column in this erect Poſture of the Creature. We continued to pour in Quick-ſilver, till it came running plentifully out at the *Vagina*, which was a ſure Sign of its penetrating far enough for entring the placentary Veſſels, if there was any Inoſculation. And to give it ſtill a greater Chance of entring the umbilical Veſſels, we tied the *Vagina* firmly, and continued to pour in Mercury at the Carotid. When we opened the Bitch, we ſaw the Veſſels of the *Uterus* and its *Cornua* very turgid with Quick-ſilver. The Body of the *Uterus* and the right

(*a*) In Syſtem. Vaſor.

right *Cornu* contained no *Fœtus*, but were diſtended with extravaſated Quick-ſilver. There was one Whelp contained in the left *Cornu*, which was taken out and laid on a Plate, after being well tied above and below where the *Fœtus* was lodged. When this *Cornu* was cut longitudinally, the *Placenta* ſeparated from it moſt eaſily; and and as they ſeparated, the Mercury ran out plentifully from the Veſſels of the *Cornu*, but not a Drop appeared in, or drilled out of any Veſſel on the exterior Surface of the *Placenta*. After the *Amnios* was opened, there was no Mercury to be ſeen in the *Fœtus* or the umbilical Veſſels, tho' we could trace theſe to their very minute Branches on the Membranes. When the Secundines had been handled ſome Time, and the *Amnios* was turned outermoſt, ſome exceeding ſmall and ſhort Streaks of Quick-ſilver appeared under that Membrane; but not being contained within any thing like the Coat of a Veſſel, Dr. *Sinclair* and I judged them to be no other than ſome Drops of the Mercury, which we had ſeen ſtick to the outer Surface of the *Placenta* when they fell from the *Cornu*, that had been preſſed by Handling into the ſmall Interſtices of the Placentary Subſtance: And therefore concluded that no Mercury had paſſed from the

the *Uterus* into the umbilical Veſſels. (*See Vol.* III. *Art.* xiii. *where this* § 16. *is further conſidered.*)

Though I think this § 16. ſufficiently proved, yet to ſhorten hereafter the Diſpute concerning the Nouriſhment of a *Fœtus*, I may remark, that it will be ſufficient for my Purpoſe in the preſent Queſtion, to have Part of the Veſſels of the Secundines granted to be Abſorbents (the Negative of which, I dare affirm, no body will undertake to prove) though others were found to be continued, or to inoſculate with thoſe of the *Uterus*.

17. The *red Particles* of the Blood are not probably abſorbed by the ſmall Extremities of the umbilical Vein.

My Reaſons for thinking ſo are: The Smallneſs of the Orifices of theſe Veſſels; the chylous Appearance of what is ſeparated by the *Glandulæ* of Cows and Sheep; and the want of an Example of red Globules being abſorbed any where elſe.

If it ſhould be asked, whence then has the *Fœtus* red Blood? I anſwer, without entring upon any philoſophical Compariſon of the *Placenta* in a *Fœtus*, and of the Lungs in reſpiring Animals, that *Fœtuſes* of viviparous Animals have their red Blood from the ſame Source that Chickens *in O-*

vo

vo have theirs; which can be no other than the Action of their Heart and of the Veſſels in their Body and Secundines.

If it ſhould be further objected, that the Inſtances mentioned § 13. of Children being exhauſted of Blood by *Hæmorrhagies* from the Mother's Veſſels, ſhew the red Globules to be ſent out from the Secundines into the *Uterus*; and therefore probably ſuch are taken in; the Anſwer is ready, *viz.* That theſe Inſtances prove the Loſs of ſuch red Particles no more, than the wan Colour, Faintneſs, and the Emptineſs of the Veſſels in a violent *Diarrhæa*, are certain Signs of bloody Stools; which none will affirm they are.

18. THE *Placenta* does not increaſe in the ſame Proportion which the *Fœtus* does, for the ſmaller the *Fœtus* is, the *Placenta* is proportionally larger (*a*).

19. THE ſmaller Share by far of the Blood ſent out by the umbilical Arteries is returned to the *Uterus*, moſt of it being poured into the umbilical Vein by anaſtomoſing Canals.

This may be ſeen by injecting Liquors into the umbilical Arteries of any Creature. *Rouhault* (*b*) calculates, that only one

(*a*) Ruyſch. ſparſim.
(*b*) Mem. de l'Acad. des Sciences, 1715.

ſeventh Part of the capillary Branches of the human umbilical Veſſels reach the exterior Surface of the *Placenta*.

20. The progreſſive Motion communicated to Liquors by the Power of Abſorption being ſlow and weak, and no external alternate Preſſure having a conſiderable Effect in increaſing the *Momentum* of the Liquors moving in the Veſſels contained within the *Uterus*, it would appear that the Blood returning to the *Fœtus* is puſhed forward principally by the Force of the Heart and Arteries of the *Fœtus* itſelf.

That the Force of the Heart may be ſtrong enough to drive forward the Blood in ſuch a long Courſe as it muſt make in the Secundines, the *Canalis arterioſus* is ſent from the pulmonary Artery into the deſcending *Aorta*, whereby the Blood thrown out by the umbilical Arteries is propelled by the united Force of both right and left Ventricles of the Heart, and theſe Arteries anaſtomoſe with the Branches of the umbilical Vein by larger communicating Canals than the Arteries and Veins commonly have in other Parts of the Body, as appears by Injections: For Liquors thrown into the umbilical Arteries towards the *Placenta*, require leſs Force to make them return by the umbilical Vein, and when injected

with

with the ſame Force, they return more quickly, than they do into the Vein correſponding to any other Artery of a Child when the Artery is injected.

21. In the greater Number of Animals that have hitherto been carefully examined, the *Allantoid* Membrane with its contained Urine has been found (*a*).

22. The *Allantois* of ſome Animals (*Mares*, *Bitches*, *Cats*,) ſurrounds the *Amnios*, being every where interpoſed between it and the *Chorion*. In others, (*Cows*, *Sheep*, *Goats*,) the *Allantois* incloſes a conſiderable Share of the *Amnios*. And in others (*Swine*, *Rabbits*,) it is confined to a ſmall Space (*b*).

23. At thoſe Places where the *Allantois* is not interpoſed between the other two Membranes of the *Fœtus*, the *Chorion* adheres to the *Amnios* by a very fine cellular Subſtance, which eaſily yields to any ſtretching Force, as every one muſt ſee in examining the Secundines.

24. The *Amnios* has numerous Ramifications of the umbilical Veſſels ſpread upon it, (*c*), the Orifices of the lateral Branches of the Arteries pouring out Liquors into its Cavity.

(*a*) Needham obſerv. anat de form fœt. cap. 3.
(*b*) Id. ibid.
(*c*) Id. ibid. Cowper Anat. of hum. Bodies, Expl. Tab. 59. A. A.

Injections plainly diſcover this; for after injecting a thin Liquor, Water for Example, into the umbilical Arteries, dry the interior Surface of the *Amnios* well with a Cloth; then preſs the Membrane gently, or continue the Injection, and the Water is ſeen coming out on that Surface, in the Form that we ſee ſmall Drops of perſpirable Matter come out on the Surface of the Skin at the Finger Points, when we preſs the Finger hard, or have tied a String round it. I have many times repeated this Experiment, and always with Succeſs.

25. SEEING we can demonſtrate Veins alſo on the *Amnios*, and ſeeing the Veins of all other membranous Bags that have arterious Canals throwing Liquors into their Cavity are endowed with an abſorbing Power, and take up Fluids from the Cavity, we may conclude that the Veins here are the ſame Way employed.

26. THE Liquor contained in the *Amnios* is either wholly ſeparated from the Veſſels of that Membrane, or it is furniſhed partly from them, and in Part from the *Fœtus*.

In the Creatures whoſe *Amnios* is every where incloſed by the *Allantois* (§ 22.) it is impoſſible this Liquor can be tranſcolated from the *Uterus* or its Cavity, thro' all the Membranes into the Cavity of the *Amnios*,

Amnios, becauſe if the *Allantois* could allow a Paſſage to ſuch a Fluid, its own Contents would neceſſarily go along with it, which every one will confeſs would be of bad Conſequence; but the Truth is, That the *Allantois* does not allow Liquors to paſs through it. In thoſe Creatures where the *Allantois* only ſurrounds part of the *Amnios*, if we did ſuppoſe the *Chorion* and *Amnios* capable every where elſe of ſerving as Strainers, the Liquor would always be found in conſiderable Quantity in the cellular Subſtance between them (§ 23.) which it is not; and what ſhould hinder it to run out as faſt it could be conveyed in?

Let none here aſſume Canals having Orifices opening on the Surface of the *Chorion*, and ſent directly into the Cavity of the *Amnios*, unleſs he undertakes to demonſtrate them.

Harvey's Obſervation (*a*) of this *Liquor Amnii* being ſeen in large Quantity before the *Fœtus* is formed, may probably be objected to me as a ſure Argument of its being derived from ſome where elſe than the umbilical Veſſels, or Surface of the *Fœtus*; and that can only be from the Cavity of the *Uterus* by Tranſcolation.

(*a*) De generat. animal. exercit. 56.

I might refuſe to anſwer this Objection, upon the Declaration already made, concerning *Alcmæon*'s Opinion of the Nouriſhment of the *Fœtus* while it is a-forming; namely, That the formed *Fœtus* is only the Subject of the preſent Queſtion; but there is no Occaſion to uſe this Screen; for all that can be made of *Harvey*'s Aſſertion, is only this Negative, That he did not ſee a *Fœtus* in the very ſmall Conceptions he examined; but it is very evident from later Obſervations (*a*), That the *Rudiments* of the *Fœtus*, and its *funis umbilicalis* may be ſeen much ſooner, and while the Conception is leſs than what he determines it to have been in the Caſes where he ſays he could not ſee it; and, in my Opinion, *extra-uterine Fœtuſes* prove clearly that the *Embryo* is always lodged much ſooner in its Secundines than we can well diſcern the different Parts of theſe; far leſs need we expect to be able to diſtinguiſh the different Parts they contain. I ſhall readily allow that the *Liquor amnii* is in larger proportional Quantity, the younger a Conception is: And the Reaſon of this Appearance

(*a*) Compare Harvey's Exercit. 15, 16, 17, with Malpighius de ovo incubato in the firſt three or four Days of Incubation, and his Exercit. 56. with Kerkring. Anthropogr. Ichnogr. and uyſch Theſ. 6.

ance may very eaſily be underſtood from what was ſaid concerning Abſorption (§ 15.) From the Obſervation itſelf, compared with what is above in this Section, I would infer that the Veſſels of the *Amnios* furniſh by much the larger Share of the Liquor contained in it.

N. Authors having differed widely concerning the Quantity and Quality of the *Liquor Amnii*, and my Obſervations not having been univerſal enough to fix a general Rule, I ſhall delay any Enquiry into the State of this Liquor, till I come to examine it as it is employed in accounting for the Nutrition of a *Fœtus*, where I ſhall conſider it, according to all the different Opinions of Authors.

27. As ſoon almoſt as we can obſerve any *Embyrio*, its umbilical Veſſels diſcover themſelves (*a*).

28. The Mouth, Lips and Cheeks of *Fœtuſes* are at firſt wanting, and leave a large Chaſm inſtead of a Mouth, which is gradually contracted by the Formation and Conjunction of theſe Parts, till it is brought to a due Size (*b*).

29. While *Fœtuſes* continue in the

(*a*) Harvey Exercit. 56. Ruyſch. Theſ. 6. & ſparſim. Riolan. Anthropograph. lib. 6. cap. ult.

(*b*) Harvey ibid.

Womb, their Muſcles are ordinarily left to act only by their natural Contraction, or the *Fœtus* is ſaid to be in a ſleeping State; but ſometimes, when its Eaſe or Preſervation requires a Change of Situation, it ſeems to perform ſome voluntary Motions, which are called its *Stirrings*.

The Poſture of a Child is owing to the Muſcles being left to their natural Contractions, the ſtronger ones always prevailing, till their Antagoniſts exert ſuch a Reſiſtance by being ſtretched, as brings them to an *Equilibrium*; no Wonder therefore, that the Spine is ſo much bowed forward, and the Head is bended towards the Knees: The Thighs are brought forward; the Legs are bended back; the Arms hang down, but are drawn a little forward; the Fore-arms, Hands and Fingers are all bended, and thereby the Hands are placed round the Knees: For it will appear to any who ſhall take the Trouble to conſider the Structure of theſe Parts, that the Members are all brought to that Side where the Muſcles have an Advantage over their Antagoniſts in Number and Strength, or in the Angles of Inſertion, or in the Length of the Lever they act with.

That the Poſture above deſcribed ariſes from the natural Contraction of the Muſcles, while

while the *Fœtus* is in a ſleeping State, is farther evinced, by obſerving how much Children ſleep after they are born, and how the Members naturally go into near the ſame Poſture when People fall aſleep.

30. THE Stomachs of the youngeſt *Fœtuſes* we can diſſect are full of a mucous Liquor, which remains of near the ſame Conſiſtence all the Time of Geſtation, except that it becomes gradually ſomewhat more viſcous as the *Fœtus* increaſes.

This has obtained in all the different Animals I have had occaſion to diſſect.

31. THE ſmall Guts of *Fœtuſes* are full of a glairy mucaginous Liquor, which becomes thicker and darker-coloured as it deſcends to the Great Guts, where it is collected under the Name of *Meconium*.

32. FOETUSES increaſe proportionally leſs the longer they continue in the Womb.

Mauriceau (*a*) pretends to determine the proportional Increaſe of a Child to be ſixty four Times its own Weight in triple the Time. The Numbers he condeſcends on are the following: At Birth, a Child weighs 12 Pounds, of 16 Ounces each; at three Months, it weighs 3 Ounces; at one Month, three

(*a*) Des maladies des femmes groſſes, liv. i. chap. 5.

three fourth Parts of half a Drachm; and at ten Days, leſs than half a Grain.

Having now eſtabliſhed the neceſſary Facts, I deſign to uſe them hereafter as ſo many Axioms or *Data*; and to ſave Repetitions, I ſhall only refer to them by the Numbers prefixed to each, in the Solution of the ſeveral Problems, to which I now return.

PROBLEM I.

How far the Mouth *or the* umbilical Veſſels *are neceſſary to the Nouriſhment of* Fœtuſes.

AUthors have all known that *Fœtuſes* have been brought forth without Mouths; but ſeveral of theſe Monſters being found, upon a ſtricter Examination, to have ſome other Paſſage leading from the Surface of their Bodies into their Stomachs, ſeveral Writers of good Account have affirmed, or, at leaſt, in an indirect Way have inſinuated, that ſuch vicarious Paſſages are never wanting when the Mouth is ſhut or deficient; which they think rather a ſtronger Proof of the ordinary Canal by the Mouth in compleat *Fœtuſes* being altogether neceſſary for the Nouriſhment of the *Fœtus*, than if no ſuch Monſters had been ſeen, ſince, ſay

ſay they, we hereby ſee how careful Nature is to preſerve a Paſſage from without into the chylopoietick Organs.

To remove all Pretences for concluding hereafter ſo generally that a vicarious Paſſage is never wanting, allow me to point out ſome Authors, who give accurate and well vouched Hiſtories of Monſters who had no ſuch Canals, and in ſome of which it was impoſſible they could have them, or they muſt have been altogether uſeleſs.

Children (*a*), a Whelp (*b*), and a Lamb (*c*), were brought forth without Heads, or any Paſſage into the chylopoietick Bowels. In other *Fœtuſes* that had Heads, all Paſſage to the Stomach was ſhut up: See ſuch Obſervations of Children (*d*), of Whelps (*e*), of a Lamb (*f*), of a Pig (*g*). And where the Paſſage into the Stomach has been open, there have been no Inteſtines (*h*). And where

(*a*) Two by Littre Mem. de l'Acad. des ſciences, 1701; one by Mery, ibid. 1720.
(*b*) De Graaf. de mulier. organ. cap. 15.
(*c*) Antoine hiſt. de l'Acad. des ſciences, 1703.
(*d*) Littre Mem. de l'Acad. des ſciences, 1701. Buchnerus act. med. phyſic. Acad. n. c. Vol. ii. Obſ. 96.
(*e*) Littre hiſt. de l'Acad. des ſciences, 1703. Brady Philoſ. Tranſ. n. 304.
(*f*) Ruyſch. Theſ. 4. n. 55.
(*g*) Bellinger. de fœt. nutr. chap. 9.
(*h*) Lemery hiſt. de l'Acad. des ſciences, 1704.

where the Guts were, nothing could get down into them (*a*).

Theſe Examples are ſo exact in ſhewing the little Neceſſity there is for either Mouth or chylopoietick Organs in the Nouriſhment of *Fœtuſes*, that I need ſcarce mention how much they ſerve to determine the firſt Part of this Problem; and they make Remarks on the Hiſtories of *Fœtuſes* who had the vicarious Paſſages, unneceſſary; only allow me to caution the young Phyſiologiſts, not to take ſome Authors Aſſertion, of the Food being conveyed by thoſe extraordinary Canals, for an eſtabliſhed Truth, till they have examined what is to be ſaid for and againſt it.

Though the former Part of the Problem ſhould be determined in the Manner I have argued for, which takes away all Probability of Nouriſhment being furniſhed to *Fœtuſes* by the Mouth alone, yet the Gentlemen who are of Opinion that it is conveyed by both the umbilical Vein and the Mouth, endeavour to reſolve the latter Part of it, ſo as ſtill to favour their Sentiments; for they undertake to prove that the Supply by the Navel may be wanting, as well as that by the Mouth; and therefore that both contributing towards the Nouriſhment in the natural State

(*a*) Calder, Medical Eſſays, Vol. I. Art. 14.

State of the *Fœtus*, whenever one of them is wanting, the other performs the Function of both, as is ſometimes done in other Parts of the Body. I acknowledge great Probability in this Reaſoning, if they can bring a clear convincing Proof of *Fœtuſes* ſubſiſting and increaſing without receiving Liquors by their Navel-ſtring. Seeing then this Part of the Problem is of ſuch Importance in the preſent Queſtion, I muſt be excuſed for inſiſting particularly on the ſeveral Facts which I have obſerved to be advanced by Authors in Proof of the Navel not being indiſpenſably neceſſary toward the Nouriſhment of a *Fœtus*.

THE firſt Argument uſed by the Gentlemen of the other Side of the Queſtion, is, That Authors of the beſt Character (*a*), who have diſſected *viviparous* Animals with young, aſſure us there is no Adheſion or Connection between the Secundines and *Uteri* of moſt Animals, for a conſiderable Time after the Conception is lodged there; and in ſome Animals, many Months paſs before there is any Adheſion (*b*); therefore, ſay they, the *Fœtus* can receive nothing all this Time from the Mother by the umbilical

(*a*) Harvey, Needham, de Graaf.
(*b*) Needham, obſ. anat. de form. fœt. cap. 2.

cal Vessels, and consequently is then wholly nourished by the Mouth.

On the Supposition that the uterine Vessels must always inosculate with those of the Secundines, before the umbilical Vessels can receive any Liquors from the Mother, this Argument is indeed of great Force; but according to the Scheme which I have explained, and, I hope, have proved in § 13,—16, of preliminary Facts, it is a Matter of Indifference whether the Liquors furnished by the Mother are applied to the bibulous Orifices of the absorbent Vessels of the Secundines, while the Liquors are contained within Cells formed in the Substance of the *Uterus*, (§ 2,—5.) or when they are poured into the Cavity of the *Uterus* itself; for those Vessels will equally well perform their Office in both Cases, and thereby serve to nourish the *Fœtus* sufficiently; which must take off the Necessity we were here imagined under, of supposing the Food to be wholly received at the Mouth. Nay in some Animals, for example *Mares*, whose *Allantois* surrounds the *Amnios* (§ 22.) and whose Secundines have no Connexion for a considerable Time with the *Uterus*, what has been just now said is finely illustrated, and there is downright Demonstration of all the *Fœtuses* Nourishment being conveyed by the umbilical

umbilical Veſſels, as was remarked, § 16.

NEXT, ſeveral Obſervations are brought to ſhew that the Paſſage of Liquors by the Navel, has often been ſtopped long before Birth; the firſt I ſhall mention is one of Mr. *Petit*: "Mr. *Petit* (ſays the Secretary of "the Academy of Sciences (*a*)) cauſed the "Navel-ſtring of a human *Fœtus* to be "ſhewn, which had a Knot in its Middle, "where one could obſerve the Marks of "the Contiguity (*d'attouchement*) of the "Parts that formed the Knot; which "proves that the Knot had been made long "before the Woman's Delivery."

It may be ſaid that this is in ſome Meaſure anſwered by what *Mauriceau* (*b*), *Deventer* (*c*), and other practical Writers in Midwifery affirm of the Danger Children are in of loſing their Lives, when the umbilical Rope is preſſed or expoſed to the cold Air before Birth; and by Obſervations of *Fœtuſes* being killed by Knots on the Navel-ſtring (*d*): But the Fact as it is told, is open to ſtrong Objections; for there is not one Circumſtance mentioned by which we can know whether this Knot ſtopped the

(*a*) Hiſt. de l'Acad. des ſciences, 1718.
(*b*) Maladies des femmes groſſes, liv. ii. chap. 26.
(*c*) Ars obſtetric. cap. 38.
(*d*) Ruyſch. Obſerv. xi. Gutterman. in commerc. Norimberg. 1731, Semeſt. I. Spec. 20.

the Courſe of the Blood, or if it was any more than one of the common ones, about which ſome Midwives make ſo much to do. I have ſent you a Figure of one, ſerving to ſhew you, by my Injection paſſing, that Liquors will not ſtop in ſuch. (*See* Tab. I. Fig. 5. *repreſenting a Piece of the* Funis umbilicalis, *whoſe Veſſels are diſtended with Wax.*) AA is the large Vein; BB the two Arteries twiſting ſpirally round the Vein; C a very remarkable Convolution of the Arteries, which reſembled a Knot, before the Injection was thrown in. Further, I ſee no Reaſon to conclude from Mr. *Petit*'s Obſervation, as the Secretary has done, that becauſe there were Marks of the Parts which compoſed the Knot, touching or being contiguous to each other; therefore the Knot muſt have been of an old ſtanding. Add to all this, that there is no Mention made of the Child's Condition, whether it was born dead or alive. So that from the whole, I muſt think there can be no Uſe made of this Obſervation in this Argument; and I muſt alſo acknowledge, that the Obſervations of Children ſaid to be killed by Knots on the Navel-ſtring, are as little to my Purpoſe; for though the Authors who relate them do aver the Knots to have been the Cauſe of Death, yet they do not mention

tion Circumstances in the Fact, sufficient to support their Opinion, for which I must decline the greatest Authority, though it was ever so favourable to my Side of the Question.

The second Observation brought to prove the Course of the Blood interrupted in the umbilical Vessels before Birth, is what Mr. *Heister* (*a*) quotes from *Fred. Hoffman*'s Dissertation *de pinguedine*. Unluckily that Treatise is not among the Collection of *Hoffman*'s Dissertations I am possess'd of, and therefore I must take the Relation of the Fact at second Hand; it is this, "A "perfect Child was born, whose umbilical "Rope was all corrupt and putrid, (*putre-* "*dine totus corruptus erat.*) Mr. *Heister* adds, "It would have been impossible that "it should have lived, unless it had taken "its Nourishment some other How than "by the Navel."

Though for ought that is expressed here by either *Hoffman* or *Heister*, it seems to be ambiguous, whether this complete Child was born dead or alive, yet I shall suppose the latter Case; and when this is granted, the Account is such as one cannot pretend to guess from it how long this Navel-string

(*a*) Compend. anat. not. 37.

had been corrupted; what Parts had been deſtroyed by the Putrefaction; whether the cellular Membrane and *Mucus* of the Rope only were affected; or if the Veſſels involved in them were alſo deſtroyed. In ſhort, this Story does not ſeem diſtinct enough to allow any Conſequence to be drawn from it. Leſt however any ſhould build on a ſtrict Senſe of the Word *TOTUS*, which *ALL the World* knows is generally uſed in a very vague Way, let ſuch reconcile any Appearance of a *funis umbilicalis*, with the total and compleat Corruption of the Membranes, *Mucus*, and Veſſels compoſing it.

THE two following Hiſtories are much more exact and to the Purpoſe: One is from *Chatton* (*a*); the other is told by *Petrus Rommelius* (*b*). Both agree almoſt exactly in the principal Circumſtances. Healthy Children are born with the Navel skinned over. The Secundines, when afterwards brought away, are of a natural Size, and the Extremities of the umbilick Rope are coaleſced. The Mother of the one told Mr. *Chatton*, that ſhe had gone with Child three Weeks longer than her ordinary Time; and he thinks the Navel was as ſound as a Child

(*a*) Vander Wiel Obſerv. cent. poſt. Pars 1. not. in Obſ. 32.
(*b*) Ephemerid. German. Dec. 2. Ann. 7. Obſ. 209.

Child three Weeks old uſed to have it. *Rommelius* judges the other Child's Navel to have been as ſound as in Children ſeveral Months old. A ſmall little impervious Proceſs about the Size of a Worm ſtood out from the Navel, and the umbilical Rope was as ſmall as a Gooſe-quill.

Theſe Authors have been very fond of ſetting the World a ſtaring, otherwiſe they would never have made the Compariſons of the Soundneſs of the Navels of the Children in their Hiſtories with thoſe of Children ſo many Weeks or Months old. I wiſh they would explain to me what is the Difference as to Soundneſs in a ſound Navel of Children three Days, Weeks, Months or Years old. Since there is none, we are to enquire how long Time theſe Navels had probably been in skinning over after the Navel-ſtring was broke or eroded. The Circumſtance of the Secundines being of a natural Size, ſhews that this Accident did not happen long before Birth; for from what was ſaid in § 14 of the *Placenta* being a lifeleſs Maſs after the Communication betwixt it and the Child is deſtroyed; and from what the beſt and moſt experienced Practiſers in Midwifery (*a*) agree in, the

(*a*) Mauriceau maladies des femmes groſſes, liv. ii. chap. 9. Ruyſch. in Theſ. Obſerv. Adverſ.

Size and State of the After-burden muſt be greatly changed in very little Time, after it is in that lifeleſs State which muſt be here ſuppoſed. The only Way of judging in what Time a Skin might be brought on the Navel of the Children mentioned in the forogoing Hiſtories, is, to determine how ſoon after Birth Childrens Navels are skinned over; and then to enquire, whether a Cicatrice would be ſooner or later brought on by the Child's continuing immerſed in its Waters after the Navel-ſtring was broke. I have frequently ſeen, and among the reſt in my own Children, the tied Piece of the Navel-ſtring fall off, in four, three or two Days after Birth; and the Skin was found where the ſhrivelled String ſeparated: And you probably know how very ſoon the Remains of the Navel-ſtring drop off from Brutes. If then ſuch a Separation can be made ſo ſoon, when dry Rags are applied, or by being expoſed to the Air, we have Reaſon to think that the Skin would be much ſooner brought on the Navel, while the Parts were ſoaking in the *Liquor Amnii*; for we have very convincing Proof what the Effects of ſuch a Salt Liquor is in the *Saliva*, which not only ſerves to keep the Mouth ſoft and flexible, but very ſoon heals Wounds or mild Abſceſſes there; the Urine will

will ſcarce allow Surgeons to keep the Wound in *Lithotomy* long enoug freſh, but notwithſtanding their utmoſt Efforts, often renders the Paſſage callous. The *Synovia* of the Joints, the glary Liquor of tendinous or ligamentous Sheaths; and in ſhort, all ſuch Liquors of our Body do the ſame. From all which I would conclude, that the Navel-ſtrings, which are the Subject of our preſent Enquiry, were broke very ſoon before Birth; and if I ſhould allow the Time to have been a Day or two, the *Fœtus* might continue ſo long in Life, without any new Supplies of Nouriſhment, as well as it does ſeveral Days after Birth, when it ordinarily takes only ſome purgative Syrups; and you have recorded (*a*) an Inſtance of a Child that lived ſeven Days after Birth, though nothing could paſs out of its Stomach into its Guts to nouriſh it. The Probability of a Child's living without Nouriſhment in the Womb ſo long as I have allowed, is certainly much greater than that it ſhould continue in Life, Days, Weeks, or Months after the Waters have been evacuated, and continued to be conſtantly diſcharged (*b*), on the Suppoſition which the Gentlemen of the other Side make of its receiving its

(*a*) Medical Eſſays, Vol. I. Art. 14.
(*b*) Mauriceau dans pluſieurs obſervat.

Food moſtly by the Mouth for ſome Time before Birth. I would therefore conclude from the whole, That theſe Children, whoſe Hiſtories *Chatton* and *Rommelius* relate, were under no Neceſſity of being ſupplied with Nouriſhment any other Way than by the Navel, and conſequently do not prove what was deſigned by appealing to them.

A MORE direct Proof of the umbilical Veſſels not being ſo neceſſary as I argue for, is offered by Examples of *Fœtuſes* who had no Navel-ſtring. I know only two Caſes where this is alledged; one is told by *Vander Wiel*; the Author of the other is anonymous.

Vander Wiel ſays (*a*), " In the Time of " the Fair at the *Hague*, in the Year 1683, " a Male Child, a Year and three Months " old, born of poor Parents in *February* " 1682, was expoſed for a Show. When " it was born, there was not the leaſt Ve- " ſtige of the umbilical Rope, and there- " fore the Midwife had no Occaſion to ſe- " parate it from the Child's Belly. The " Navel alſo was wanting; but inſtead of " it, a broad round red Spot, as large as a " *Stiver* Piece of Money, covered with a " very

(*a*) Obſerv. cent. poſt. Pars 1. Obſerv. 32.

" very thin Skin appeared in the *Hypoga-*
" *ſtrium*, near to the Share-bones; with-
" in the Circumference of which Spot, two
" *Papillulæ* or Aquæducts were ſeen, at
" an Inch Diſtance from each other, by
" which the Urine was evacuated. The
" Child died at three Years of Age." In the Notes upon this Obſervation he tells us, its Body was not opened after its Death.

This ſeems to me ſuch a Hiſtory, as one can rely very little on; for it would appear to be on the Parents Information that *Vander Wiel* aſſerts there was no Navel-ſtring; their Buſineſs to be ſure was to make the Caſe as wonderful as they could, to draw in Cuſtomers. There is not any where mention of Secundines, to know whether the umbilical Rope was hanging at them; and the Breadth of the Spot anſwers very well to the Navel; which probably would have been made as certain by a Diſſection, as it was conſpicuous in another Caſe related towards the End of the Notes upon this Obſervation, and very like to it in all the principal Circumſtances, excepting that here the umbilical Rope was evident. (*See ſuch a Hiſtory in Vol.* III. *Art.* XIV.) Since then this Hiſtory is ſo imperfect, and on a Hearſay, while the very Caſe which the Author tells as analo-

gous to it, brings it to make for my Side of the Question, I am hopeful it will not be advanced any more against me.

The second Case of a Navel being wanting, is told in a Letter of an anonymous Author in Words to this Purpose (*a*): "A "Hare big with young being caught, its "Belly was carefully opened, and immediately three considerable Balls tumbled "out; they were of a whitish Colour externally," with this Difference, that the "Coat of the first which fell out was not "pellucid, whereas the other two were "surrounded with a pellucid Coat. I considered these Globes accurately, and "could not observe on their Surface the "least Mark of their adhering any where. "I also with great Care examined the *Uterus* that was cut out, which I found "perfectly intire, and of a natural Size, "without any Marks of a Conception, or "of any Breach in it. When I had cautiously cut these Globes or Balls, I found "in each a little Hare covered all over "with Fur, and of the Bigness new-kittled "Hares commonly are. The Membranes "surrounding them were easily taken off "whole and intire; but I could find no "Vestige

(*a*) Commerc. Literar. Norimberg. 1731. Sect. 37. Art. 4.

" Veſtige of the umbilical Rope either in " the ſeparated Membranes or Bodies of " the Hares. After this I viewed the Mem- " branes more exactly, diſcovering them " to be double and eaſily ſeparable. In " the Ball whoſe Membranes I ſaid were " opack, the external one was thicker; " the one within this was thin and pellu- " cid, its internal Surface being covered " with a yellowiſh *Mucus*. Internally " there was a Space about the Bigneſs of a " *Gulder-piece* of Money, that reſembled " a ſmall uterine *Placenta*, equally cover- " ed with a thin Skin, but without any " Veſtige of the umbilical Rope. I cut the " *Placentulæ*, and found them internally " Liver-like, (*Hepatiformes*) whitiſh, of " a ſoft vaſcular Texture, full of Canals " and *Papillulæ*. Theſe are what were " partly faithfully related to me, and part- " ly were obſerved and remarked by my " ſelf. Indeed having never had an Op- " portunity, I did not ſearch into the *Fœ-* " *tuſes* of Hares before. This whole Mat- " ter ſeems a Paradox to me."

Many Inconſiſtencies diſcover themſelves in this Obſervation at firſt Reading, even in the Part of it where one would think the Author is telling what he ſaw. Two of the Balls are pellucid, and the third has only

only a round Spot on the interior Surface of its Membranes, which he ſeems wiſely to expect ſhould have had umbilical Veſſels coming out from it, and is much diſappointed at miſſing of them: After, I ſay, he has thus made it evident, that there were no *Placentæ*, yet afterwards hepatiform vaſcular *Placentæ* are very accurately deſcribed.——— The Membranes are taken off whole and intire from the *Fœtuſes* incloſed in them, after the Globes containing the *Fœtuſes* had been cautiouſly cut.——— The *Placentæ* are *Hepatiformes*, either from their Shape, Form and Bulk, being before inviſible; or they are like Livers, becauſe they are white.—— Though it is now agreed that a *Placenta* is no more than numerous Ramifications of the umbilicall Veſſels, yet here are *Placentæ*, without their Veſſels being derived from any Part; which to me appears to be an expreſs Contradiction and Impoſſibility.——— Though the whole Affair is a Paradox to him, he has not the Curioſity to open one of the young Hares, that he might ſee whether the umbilical Veſſels were wanting within their Bodies as well as without.

Though this Gentleman has concealed himſelf in a Country where People are far from ſhunning to be the firſt publick Tellers

lers of ſuch Prodigies of Nature as come to their Knowledge, yet I ſhall not doubt of his Sincerity; but cannot help ſaying, that his Ignorance, at leaſt in the Structure of the *Fœtuſes* of Hares, which he ſays he never had an Opportunity of diſſecting before, has led him into Miſtakes numerous enough to give me ſufficient Cauſe to decline his Teſtimony. And as to the principal Thing which relates to the preſent Queſtion, the want of a *funis umbilicalis*, I think I can, with the Help of *Needham*'s third Table of his Obſervations *de form. fœt.* make an Apology for his not diſcovering it, by ſhewing that others, more accuſtomed to the Diſſection of Hares, might have miſſed of it as well as he. *Needham* repreſents the *Fœtus* of a Rabbet with its Secundines (which differ ſcarce any thing from thoſe of a Hare) where that Part of the umbilical Rope in which all the Veſſels are incloſed, is very ſhort, and ſeven or eight conſiderable Branches go from it ſeparately to the *Placenta*. If theſe Veſſels were all broke at the Place where they ſeparate, by the running of the Dam, or falling out of the Balls, or in opening the Membranes, the ſhort Navel-ſtring would contract, and be hid by the Fur, ſo as to be diſcovered with Difficulty; and the Extremities

tremities of the broken Veſſels would appear on the *Placenta* like *Papillulæ*, and the *Placenta* would be vaſcular and whitiſh-coloured, as the anonymous Obſervator has deſcribed it. This Account is natural and eaſy enough to bear a ſtrong Air of Truth with it.

If then accurate Inſtances are recorded of *Fœtuſes* being nouriſhed without any Poſſibility of their receiving Aliment by the Mouth, or into their *chylopoietic* Organs; and if there can be no diſtinct unexceptionable Proof made out of their being ever ſupplied with Nouriſhment without the Navel-ſtring, I muſt determine the firſt Problem, by affirming, *That the umbilical Veſſels are abſolutely neceſſary towards the Nouriſhment of a* Fœtus; *and that the Mouth is not ſo,*

PROBLEM II.

Whether the Liquor contained in the Amnios *is proper* Food *for a* Fœtus.

When we conſider this Liquor as it is ſometimes repreſented, to wit, that it is at firſt mild and mucaginous, and afterwards becomes thinner, more acrid and urinous, it would appear ill calculated for the

the Food of the *Fœtus* in its different States: For while the Parts of a *Fœtus* are weak, and have little Action, they are not ſo well fitted for digeſting and breaking the Coheſion of a Fluid, whoſe Particles ſeparate with ſuch Difficulty; whereas it would have been much more capable of digeſting ſtronger Food after its Stomach, Guts and other *chylopoietic* Organs were become ſtronger, conſequently this Liquor ought to have been of the reverſe Conſiſtence to what is above deſcribed, as we ſee happens in a Caſe which muſt be allowed to be very analogous to the preſent Subject, that is, in the Conſiſtence of Milk, which is at firſt thin and purgative, but afterwards becomes thicker and ſtronger Food.

Needham may perhaps be ſaid to have deſcribed this Liquor really to be as I have argued it ſhould have been formed; for he tells us (*a*), "That the Liquor of the *Amnios* becomes conſiderably thicker than it was at firſt in the larger Animals:" And in another Place (*b*) he affirms, "That it gradually becomes thicker, and ſoon acquires the Conſiſtence of the White of an Egg; nay, in the laſt Months of a Cow's going with Young, it is thicker and

(*a*) Obſerv. anat. de form. fœt. cap. 3.
(*b*) Ibid. cap. 5.

" and more viſcid than any Gelly." This agrees exactly with what I alſo remarked in Cows, whoſe *Fœtuſes*, with their Secundines, I have examined in a great many different Ages. But neither in this View of the Conſiſtence of this Liquor does it appear proper Nouriſhment; for according to the old Adage, *Eſt modus in rebus*, though the Food of a *Fœtus* might be expected to be groſſer in the laſt Months, when its Organs are ſtronger than ſoon after Conception, yet a Liquor ſo very thick and viſcid as *Needham* deſcribes, would be altogether indiſſoluble, and very improper for nouriſhing a Creature whoſe Organs of Digeſtion are ſtill in a tender State, and for whom Nature has provided ſuch a dilute fine Liquor as Milk is, to ſerve for Food a conſiderable Time after Birth, when all its Parts are become much more robuſt and ſtrong. If we can make any Judgment in this Affair, from a View of the ordinary Courſe and Tenor of Nature, we muſt think that if the *Liquor Amnii* had been deſigned to be ſwallowed for Food, it would have been at firſt a thin *Serum* that gradually came afterwards near to the Conſiſtence and Nature of Milk; but this I never ſaw, nor do I know that any has affirmed this Liquor to have been ever obſerved of ſuch a proper Conſiſtence in the dif-

different Times of Gravidation; and therefore muſt conclude that it is not deſigned to ſerve for Food.

THE *Liquor Amnii* ſeems not only thus improper Food, while it is in a natural State; but there are Examples of its being ſo much depraved, that it muſt have been of the worſt Conſequences to the *Fœtus* to have fed upon it. Such is the Hiſtory related by Dr. *Bellinger* (*a*), of a Woman who had laboured under a virulent *Gonorrhea* during her Pregnancy, of which ſhe was cured a very little Time before her Delivery. The Waters were very putrid and fetid, and the Membranes tender and almoſt rotten; yet the Child was born well and healthy, which the Doctor thinks could not have happened, if this Child had received ſuch putrid Waters into its Bowels.

The Force of this Obſervation is attempted to be taken off, by remarking, That Poiſons, and other noxious Subſtances do leſs Harm when taken into the Stomach, than when immediately mixed with the Blood. Every Body I believe will grant this to be true, if the Quantities received both Ways are equal: But it is of no Uſe in the preſent Queſtion, unleſs this other Pro-

(*a*) Tract. de fœt. nutr. chap. 9.

Propoſition is alſo proved, *viz.* That ſuch a Quantity of this putrid Liquor, as will be ſufficient to nouriſh the *Fœtus*, muſt be taken in either by the Mouth or umbilical Veſſels; then indeed by a plain ſyllogiſtical Conſequence it follows, that ſuch a Quantity of the putrid *Liquor Amnii* will do leſs Harm, by being received at the Mouth, than if it had been conveyed by the Navel. I can however ſee no Reaſon to allow the *minor* Propoſition to be true; nor am I ſenſible of being brought, by a Denial of this Propoſition, under a Neceſſity of giving the *Placenta* a Faculty of ſeparating the Pure from the Impure, or of having the Goodneſs to ſend the Impure to the *Amnios*, where it does no Harm, and the Pure to the *Fœtus*, where it does much Good. I preſume every one's Practice has taught him, that there is is no Neceſſity to ſuppoſe the whole Maſs of the Mother's Blood to have been tainted by the virulent Matter of this *Gonorrhœa*. I can imagine this Diſeaſe to have had its Seat at firſt in the *Vagina*, and then to have attacked the internal *Os Uteri*, and the *Mucus* with which it is commonly filled in the Time of Pregnancy; (*See an Inſtance of an ulcerated* Os Uteri *from ſuch a Cauſe by* Des Noves(*a*).) and

(*a*) Morgagn. adverſ. anat. 4. animad. 40.

and this corrupted *Mucus* might communicate its *Fœtor* to the Liquor of the *Amnios*, without the Veſſels of the *Placenta* having received one Drop of this putrid Liquor; and therefore, according to the Doctrine which I endeavour to ſupport, the Child might remain healthy and ſound, unleſs the Waters had been long enough acrid to affect the Surface of its Body; whereas, had ſuch putrid Liquor ſerved it for Food a very ſhort Time, it ſcarce could have eſcaped without ſome Diſeaſe. Nay, from what was ſaid concerning the Source of the *Liquor Amnii* being either the *Fœtus*, or its umbilical Arteries, (*vid.* § 24 and 26.) it neceſſarily follows that the *Liquor Amnii* in this Caſe could not have been corrupted in any other Way than what I have juſt now aſſigned; for we can never imagine that a Child could have ſuch corrupted Liquors circulating in its Veſſels, without being tainted.

It may be objected from what I have ſaid (§ 25.) of the Branches of the umbilical Vein abſorbing the *Liquor Amnii*, that ſuppoſing this Liquor to have been corrupted in the manner I have explained it, the *Fœtus* could not have remained ſound, becauſe the abſorbent Veins muſt have taken up this corrupted Stuff, to mix it with the Blood of the *Fœtus*. To this I anſwer,

That the Quantity taken up by Abſorption, is but ſmall, and the Time would appear to have been but ſhort, in which it could here have been abſorbed. Next, I would obſerve, That though a gentle Contraction is neceſſary for increaſing Abſorption, yet very acrid Subſtances irritate abſorbent Veſſels to ſuch a ſtrong Contraction, as makes them uncapable of performing their Functions, which I take to be one principal Reaſon why Poiſons when ſwallowed, do ſo much leſs Harm, than when they are immediately mixed with the Blood; and hence the very acrid Kinds of them are obſerved to produce all their bad Effects on the *primæ viæ*, without any Appearance of their having entred the Blood-veſſels(*a*): So that we have Reaſon to think the Child to have been in much leſs Danger of ſuffering, by what the Abſorbents of the *Amnios* could take up in ſuch a Caſe, than if the putrid Liquor had been ſwallowed for Food, when it would ſurely have hurt the alimentary Tube; and if it had gone further, it muſt have tainted the whole Maſs of Blood; or if the Lacteals had refuſed it Entrance, the Child would have been famiſhed; and at any Rate it would have laboured

(*a*) Wepfer de Cicut. aquat. Mead on Poiſons

boured under ſome Diſeaſe, whereas in the Hiſtory it is affirmed to have been ſound and healthy.

WHETHER then we conſider the Liquor of the *Amnios* in a ſound or morbid State, *it appears to be very ill calculated for ſerving as Food to be taken into the Stomach of a* Fœtus.

PROBLEM III.

Whether the Liquor Amnii *paſſes into the Stomach of a* Fœtus.

THE Impoſſibility of having ocular Demonſtration of the Fact inquired after in this *third Problem*, has occaſioned a great many Circumſtances to be uſed by way of Arguments, each of which we muſt examine; and if they all point one Way, and the Concluſions ariſing from them are favoured by the Solutions of the two preceding Problems, the general Concluſion concerning the Nutrition of the *Fœtus* will be ſufficiently warranted.

THE firſt Thing I offer againſt the *Liquor Amnii* paſſing into the Stomach of a *Fœtus* is, the Improbability of a Liquor that is to ſerve for Food being previouſly ſent into the *Fœtus*'s own Veſſels, there

to circulate and to be ſecerned in order to prepare it for being ſwallowed, which § 24. and 26. ſhew would be the Caſe on this Suppoſition.

No Matter where this Liquor is ſeparated, or from what Source it comes, will the Advocates of the other Side ſay, if its Paſſage into the Stomach can be proved; which they infer does happen from,

1. The Reſemblance which they alledge is to be ſeen between the Liquor of the *Amnios*, and that of the Stomach.

I have already deſcribed the Liquor of the Stomach, as I have ſeen it in *Fœtuſes* of different Animals, (*See* § 30.) but have not had Opportunities to obſerve the Liquor of the *Amnios* in the different States of a ſufficient Variety of *Fœtuſes*; and therefore ſhall firſt conſider it, as it is repreſented by the Gentlemen who differ in Opinion from me, and afterwards ſhall ſuppoſe what I ſaw in Cows to be general.

If the Liquor of the *Amnios* is at firſt mild and mucaginous, and afterwards becomes thinner and more acrid, it differs greatly from the Liquor of the Stomach, which on the contrary turns gradually more viſcous as the *Fœtus* increaſes. (§ 30.) Nor will it ſuffice to ſay, that the finer Parts are abſorbed by the Veſſels of the

Sto-

Stomach, for by ſuch an Abſorption it could never happen, that a thin watery Liquor would leave a greater Quantity of a groſs *Mucus* than a thick Gelly would do; eſpecially when there is leſs Time allowed for the Abſorption of the watery Liquor, by the quicker Digeſtion which the *Fœtus* muſt be ſuppoſed to have, when it becomes larger and ſtronger. Upon which Account too, the Contents of the Stomach would be more and much oftner diluted by the thin Food ſwallowed in greater Quantities, and more frequently. And then, we might expect ſometimes to ſee the thin Liquor lately taken down, and the thick Remains of the former Food diſtinct, without being blended, as we obſerve the *Mucus* of the Stomach of Adults to keep in a ſeparate Body from any thin Liquors drunk ſome little Time before they are vomited: This however is never obſerved in the *Fœtus*, though it has neither Reſpiration, Vomiting, nor other conquaſſatory Preſſure on its Stomach to incorporate the different Liquors contained there; and therefore there is no Probability that they ſhould be ſo intimately blended. So that on the whole, the Liquors of the *Amnios* and Stomach are ſo far from reſembling each other in this Caſe, that their Appearances diſcover them

to be very different, and destroy the Supposition of that of the *Amnios* ever being sent down into the Stomach.

Let us next see how well the *Liquor Amnii* of Cows, taken for a general Rule, will serve to support this alledged Resemblance. It must indeed be owned, that till the Liquor of the *Amnios* comes to a certain Degree of Viscidity, which, as near as I could guess, happens when the Cow has gone three fourths of her Time, the Appearances of Resemblance are pretty favourable, only while the *Fœtus* is very young, the Objections to the former Supposition take Place, because for some time this Liquor is glairy, then becomes more watery, and afterwards thickens, till it comes to much the same Consistence with that in the Stomach, at the Period just now mentioned, after which the Appearances are quite destructive of any Resemblance; for the *Liquor Amnii* becomes considerably thicker: And even during that favourable Period, when their Consistence is so like, I have often seen the *Liquor Amnii* of a dark-brown Colour and turbid, while the Liquor in the Stomach was of a very pale watery Colour, and pellucid; and at other times I have observed the contrary of this, and other remarkable Varie-

ties

ties of Appearances: Which perſwades me that there is no Communication between the Cavity of the *Amnios* and the Stomach.

You certainly have remarked, that I have made no Compariſon of the Taſte, Smell, or Coagulation of theſe two Liquors, which is omitted deſignedly, becauſe neither Smell nor Taſte are very greatly different in any of the ſaltiſh watery Liquors of the Body, for that in the *Pericardium*, *Thorax*, *Abdomen*, *Joints*, the *Saliva*, *&c.* of a *Fœtus* ſmell and taſte as like to either of the Liquors that are the immediate Subject of our Enquiry, as theſe two do to each other; and different Salts, Heat, *&c.* produce much the ſame Effect upon all of them.

2. The Liquor of the *Amnios* is ſaid to be generally conſumed, or in very little Quantity, at or near the Birth; from which it is inferred, that it has been ſwallowed down by the *Fœtus*. *De Graaf*, in Confirmation of this Fact, tells us (*a*), that he diſſected a Rabbit when ſhe was about to kittle: In the Time of his diſſecting the Mother, ſome of the *Fœtuſes* came out with their Membranes intire, and without auy Liquor contained in the *Amnios* or *Chorion*. He obſerved alſo the ſame Thing in

(*a*) De mulier. organ. cap. 15.

the others that were taken out of the *Uterus*; and to be assured that the Coats were not broken, he distended the Membranes with Air, and found they were intire.

Whatever Truth is in the general Proposition, I think *De Graaf*'s Observation, which he fancies equal to a Proof of it, is good for little; because it shews only what happened in that particular Animal, without determining what the Quantity of the Liquor is for ordinary in Rabbits; far less does it teach us what we ought to say of Animals in general.

I am certain that a great many Creatures have not all this Liquor consumed at Birth, having had my Arm wet up to the Shoulder when the Waters broke, while my Hand was in the *Vagina*, in some Cases where Necessity has obliged me to act the *Accoucheur* to Women; and we see every Day how the Cloaths are wet when the Waters come away. I have also seen a remarkable Quantity of Liquors still remaining in the *Amnios* after the Delivery of several Animals, but my Observations have not been sufficient to determine (except in one Species of Animals, *Cows*,) what Proportion the Liquor of the *Amnios* bears at Birth to what it was formerly; and I know no Author, except *Harvey*, who seems to write

write on this Subject accurately, and from Observation. When he is endeavouring to prove the *Liquor Amnii* to serve for Food to the *Fœtus*, he raises this Objection to himself (*a*); "One might believe, that "the Liquors which we appointed for "Food to the *Fœtus* are excrementitious, "and chiefly on this Account, because "they increase as the *Fœtus* turns bigger; "and in the Birth of several Creatures, "when it is probable all the Aliment is "consumed, they are seen in great Plen-"ty." And where he is treating of the human Waters, and is proving the *Liquor Amnii* to be no Excrement, he says (*b*), "It is seen in less Quantity proportionally "(*pro proportione*) near the Time of "Birth." Allow me to add what Obser-vations frequently repeated have taught me, that in *Cows* this Liquor is evidently decreasing in its Quantity some Months before the Delivery.

You surely see what a Loss I must be at to lay down any general Rule concerning the proportional Quantity of the *Liquor Amnii* in the different Times of Gravida-tion of different Animals. What the Gen-tlemen who differ in Opinion from me will undoubt-

(*a*) De humor. uter.
(*b*) Exercit. 56.

undoubtedly be beſt pleaſed with, is to take my own Obſervations on *Cows* as the general Rule; which I am ſatisfied rather to do, than be expoſed to perpetual Wrangling about this Fact. Let us ſuppoſe then, that the Liquor of the *Amnios* increaſes in its Quantity for ſome more than the firſt Half of the Time of Geſtation, and after that decreaſes, till at the Birth it is in very ſmall Quantity. The Conſequence they draw is, That the Conſumption of the Liquor is made by its paſſing into the Stomach of the *Fœtus*. But, with Submiſſion, they cannot come ſo ſoon at their Concluſion; They muſt previouſly prove one or other of theſe two Propoſitions, either that the Liquor does go down into the Stomach, or, that it cannot poſſibly be carried off any other Way. The Truth or Falſhood of the firſt of theſe depends on the Arguments examined in the ſubſequent Part of this Eſſay, and muſt ſhare the ſame Fate with them; and as to the latter Propoſition, I flatter my ſelf that I have demonſtrated another Paſſage by which it may go, (§ 25.) and really by which only we can ſuppoſe it to go, in order to account for all the *Phænomena*, which I would do thus. While the *Fœtus* is weak, the Arteries of the *Amnios* pour out more than the Veins take

take up, (§ 15 and 26.) and the Heat, aſſiſted by the conquaſſatory Motions, to which the Liquor is expoſed, melts down its Particles, and makes it appear more watery: But when the Veſſels of the *Fœtus* become ſtronger, and conſequently the Veins abſorb more, (§ 15.) the Quantity collected does not increaſe ſo faſt, and in ſome Time the Liquors thrown out, and thoſe abſorbed are pretty near equal, when the Quantity of the *Liquor Amnii* remains much the ſame; till at laſt the Veins prevailing, the Quantity diminiſhes, and continues to do ſo till Birth: But ſeeing the Veins take up chiefly the finer Particles, what they leave muſt become more thick and viſcous. All this will *cæteris paribus* be obſerved in different Animals proportionally to the Sizes and Number of the Veſſels. If what *Rouhault* (*a*) affirms be true, of the human *Liquor Amnii* being always in a watery State, (which ſo far as I could obſerve, it is rather more than in other Creatures;) the Arteries or exhalant Veſſels are ſmaller, and the Veins perform leſs Abſorption than thoſe of Brutes do.

This *Liquor Amnii* ſerves to keep the *Fœtus* and its Membranes ſoft and extenſible,

(*a*) Mem. de l'Acad. des ſciences, 1714.

ſible, hinders them to cohere, and defends the *Fœtus* from Preſſure or other Violence, which it needs moſt to be protected from, while its Parts are very tender, for which this Liquor is then, at leaſt, in greater Proportion than afterwards, when the *Fœtus* is firm and ſtronger; and by the Liquors real or proportional Quantity being leſs towards the Time of Birth, the Mother is not in ſo much Danger of ſuffering by the overſtretching of her *Uterus*, as ſhe certainly would be, if the Waters increaſed proportionally with the *Fœtus*.

What I have ſaid of the Changes produced on the *Liquor Amnii*, will perhaps be better underſtood, by naming ſome analogous Caſes; ſuch are, the viſcid Nature which the Water in a Dropſy of old ſtanding acquires; the Progreſs of incyſted Tumors from a *Hydatis* to a *Steatom*; the Courſe of a large *Oedema* at the End of an acute Diſeaſe, to its changing into what the Surgeons call a *white Swelling*, and at laſt to its Cure. None that I know ever affirmed the Liquors reaſſumed into the Maſs of Blood in any of theſe Caſes; nor what is conſtantly abſorbed in a natural State, from the *Pericardium*, *Thorax*, *Abdomen*, &c. to ſerve as Nouriſhment; and therefore I cannot expect that what is juſt now

ſaid

ſaid of the *Liquor Amnii* will weaken what I ſaid formerly of the Improbability of a Creature's furniſhing its own Food.

3. BESIDES theſe Arguments deduced from the Quality and Quantity of the *Liquor Amnii*, it is further pleaded by thoſe who favour the Opinion of the Nutrition of a *Fœtus* by the Mouth, That the *Fœtus* ſhews it was in Uſe to take down Aliment while it was in the Womb, by its knowing how to ſuck as ſoon as it is born.

This is building on that *divinæ particula auræ*, that Principle which is commonly called *Inſtinct*, and of which we obſerve daily Examples in propagating the Species, and preſerving the Individuals among Animals, but of which we have no Comprehenſion. Can any one aſſign a phyſical Cauſe, why of Ducklins and Chickens hatched under the ſame Hen, the former ſhould, contrary to the Example and anxious Warnings of the Parent, run into each Pool they can come at, while the others ſhun going into Water? Who taught a young Stallion that has been always kept out of Sight of Mares, either the Inſtruments or Manner of Generation? And in the preſent Caſe, what is there in the leaſt analogous to a Nipple within the *Amnios*, on which the *Fœtus* could have practiſed

ſuck-

ſucking while in the Womb? Theſe are Subjects we may admire, but loſe our ſelves when ever we pretend to account for them.

4. HERE is, ſay they again, a Liquor in the *Amnios* conſtantly applied to the Oriſice of a Canal that leads to a Cavity, and therefore it probably will paſs down there.

To this it is anſwered, That there are Impediments both to the Entry and Paſſage of the Liquor. The firſt is, the Lips being generally found ſhut in a *Fœtus:* This however is denied by the other Side to be true in Fact. In my Opinion it is of no great Conſequence in the Argument, whether the Lips of a *Fœtus* are found to be contiguous or not, unleſs ſome other Circumſtances can be determined at the ſame Time. If the Lips, for Example, are found ſhut, it is neceſſary to know whether the *Fœtus*, while in Life, had not or did not exerciſe the Power of opening them. And if, on the other Hand, the Mouth is ſeen open, we ought to enquire whether that is not owing to the ſhriveling Contraction or handling of the Parts after Death. In moſt of the *Fœtuſes* of Cows which I looked at, the Lips were contiguous; in ſome few, I have ſeen the Point of the Tongue lying between them; and in all the human *Fœ-*

tuſes

tuſes which I have had the Opportunity of ſeeing, the Lips were contiguous. One might indeed judge that the Mouth generally would be ſhut in a living *Fœtus*, from what was ſaid (§ 29.) of the Muſcles of a *Fœtus* being left to their natural Action; and from what we ſee in moſt Animals when they are aſleep. The Force by which the Lips are kept contiguous, will however not probably be ſo great, as that by which the Eye-lids are ſhut, becauſe the *Sphincter oris* does not ſeem to be ſo much ſuperior to its Antagoniſts, as the *orbicularis palpebrarum* is to the *rectus aperiens palpebram*.

This Obſtacle of the Lips is not the only one; for the Under-jaw, being ſupported by its *Levators*, will keep the Tongue applied to the Roof of the Mouth; and the *Pharynx* always is ſhut in Animals, unleſs when the voluntary convulſive Action of Deglutition is performed. That I might know how theſe Parts appeared in a *Fœtus*, I opened the Mouths of ſeveral, then cautiouſly depreſſing the Point of the Tongue, I ſaw the Root of it raiſed up againſt the Palate. When the Root was alſo depreſſed, I obſerved the *velum pendulum* was hollow below, where the Tongue had been lodged, and was ſo convex above, as to

ſhut

ſhut up the Paſſages to the Noſtrils. As to the *Pharynx* being always ſhut, it is univerſally known; but to make ſure of it, I put a Funnel into the Mouths of ſeveral *Fœtuſes*, after their Tongues were depreſſed, and holding them erect, I poured Water into the Funnel, but none paſſed farther than the Root of the Tongue.

I cannot omit the Mention of the remarkable Mechaniſm employed here, for keeping the Tongue cloſely applied to the Palate, chuſing the human *Fœtus*, as beſt known, to illuſtrate it by. You know that the Force exerted by Muſcles in their natural Contraction is increaſed and diminiſhed proportionally to their being more or leſs ſtretched. You alſo know, that the Muſcles coming from the Jaw to the Tongue and *Os Hyoides* are thicker, conſequently ſtronger than thoſe that come to theſe Parts from the *Sternum* and *Scapulæ*. Now, when a *Fœtus* lies with its Neck bended, ſuch of thoſe Muſcles as are ſituated below the *Os Hyoides* are conſiderably relaxed, which thoſe above it are not. Since therefore theſe latter are naturally ſtronger, and gain ſo much over the others by the Difference of their ſtretching, it is no Wonder that they pull the *Os Hyoides*, Tongue, *&c.* ſtrongly upwards, and

preſs

preſs them ſo ſtrongly againſt the upper Part of the *Fauces* and Mouth, as to leave their Print in the flexible Parts, and by bringing all the Sides of the Paſſage into the *Oeſophagus* cloſe together, prevent any Thing's getting down into it.

Since then there are ſuch Obſtacles to be overcome, the *Liquor Amnii* cannot paſs, unleſs either the Force with which it is ſqueezed is ſuperior to the Reſiſtance, or the *Fœtus* muſt perform the Action of Deglutition.

I SHALL not ſtop here to conſider the bad Conſequences which ſuch Preſſure on the very tender Parts would have, while the Chaſm of the Mouth is not ſhut (§ 28.) to make Reſiſtance; but ſhall proceed directly to examine what is called by ſeveral Writers an Experiment which demonſtrates the Paſſage of the Liquor of the *Amnios* into the Stomach: It is related thus by Mr. *Heiſter* (*a*), "I received a full-formed perfect *Fœtus* of a Cow, incloſed in "the *Uterus* and Membranes, in cold "Winter Weather; where not only the "Liquor of the *Amnios* which ſurrounds "the *Fœtus* was frozen, but the ſame Li"quor was found frozen in the Mouth,

(*a*) Compend. Anat. not. 37.

" *Oeſophagus* and Stomach, like one con-
" tinued Subſtance: The Column of Ice
" in the *Oeſophagus* was about an Inch
" thick. I happened to ſee the ſame ano-
" ther Winter."

If any Uſe is to be made of this Experiment, in proving the *Liquor Amnii* to be ſent into the Stomach, it muſt be ſaid, that the freezing of the Liquors did no more than ſhew more diſtinctly how the Waters were lodged before they were turned into Ice; and if this is true, then we would ſee all the Contents of the Stomach run out, whenever a *Fœtus* is ſuſpended with its Head loweſt; or if the Mouth and *Oeſophagus* are ſlit open, while the *Fœtus* is hanged by its Mouth after being taken out of the *Liquor Amnii*, we would obſerve Part of the Column of Water to run out at every Cut, and all the Canal would be ſeen full below where it is opened. Theſe Things would certainly, I ſay, be ſeen, if the Experiment did no more than conſolidate the Water naturally lodged in the *Oeſophagus*. But, after many repeated Trials, I can aſſure you, that none of theſe Things do happen; and therefore it is more reaſonable to believe, that the Icy Column which Mr. *Heiſter* ſaw in the *Oeſophagus*, was introduced there from the *Amnios* or

Sto-

Stomach by the immenſe expanding Force of freezing Liquors confined within the frozen rigid *Uterus* and Secundines, which every body knows is far ſuperior to any Reſiſtance can be ſuppoſed here.

To make my ſelf ſtill more certain about the Nature of this Experiment, I repeated the Trial, already mentioned, of pouring Water into the Mouth through a Funnel; and that it might not be thought to be hindred by the Liquors already contained there, I emptied the Stomach before I began to pour the Water; but ſtill the ſame Succeſs of nothing paſſing down attended it. To confirm all more, I puſhed a *Trocar* into the *Amnios* of ſeveral Calves involved in the *Uterus* and Secundines, and forcibly injected Milk through the *Cannula* of the *Trocar*; then I cauſed the *Uterus* to be preſſed ſtrongly by ſeveral People, ſome times equally, other whiles alternately; but though the Milk was thus intimately blended with the *Liquor Amnii*, none of it would paſs into the Stomach; which to me is a Demonſtration, that Mr. *Heiſter*'s Experiment ought not to be mentioned as a Proof of what naturally happens to a *Fœtus*, but only as a Trial of the Force of Expanſion in freezing Liquors.

THE only other Suppoſition to be made

of the *Fœtus* taking the *Liquor Amnii* into its Stomach is, that it ſwallows down theſe Waters, by performing the voluntary convulſive Action of Deglutition.

The Gentlemen who take upon them to aſſert, that the *Fœtus* does perform Deglutition, being bound to bring ſome direct poſitive Proof of it, I ſhall forbear the Mention of probable Negatives, till I ſee how they maintain their Affirmation. At preſent I know nothing they can ſupport it by, unleſs they ſay, that becauſe it has the Organs, and a Capacity of exerciſing them, therefore it does perform this Action, as well as it employs ſome other Muſcles in its *Stirrings*. But this way of Reaſoning can never ſerve their Purpoſe, becauſe there are many other Actions which a *Fœtus* has the Organs and Capacity to perform, and yet evidently does them not; ſo before they can make Uſe of the foregoing Argument, they muſt ſhew ſome Neceſſity the *Fœtus* is under to perform this particular Action, or ſome manifeſt Advantage it is to gain by it. This will bring them to have Recourſe probably to the Advantage of taking in Food; but by what was ſaid in the Solution of the ſecond Problem, and elſewhere in this Paper, I hope it appears, that inſtead of an Advantage, this would rather

be

be hurtful to them: And therefore, if the Will did contribute to the Actions of theſe Organs of Deglutition in a *Fœtus*, it would be directed by *Inſtinct* to keep the Paſſage into the Stomach cloſe ſhut, inſtead of forcing down the *Liquor Amnii* into it.

5. Lest the direct Proof of the *Liquor Amnii* being preſſed or ſwallowed down ſhould fail, there are ſome other Arguments advanced that are thought to imply a Neceſſity of ſuch a Liquor having been taken down; among the reſt it is argued, That it is neceſſary to keep the chylopoietick Organs of ſufficient Dimenſions, for receiving the due Supplies of Food after Birth.

If it had been conſidered how very languid and ſlow the Motion of the Contents of theſe Organs muſt be in a *Fœtus*, where the contractile Tone of its own Fibres are ſo very weak, and where there is no exterior alternate Preſſure by Reſpiration, or any other Power, it might have been thought that the Liquors ſupplied by the Veſſels of theſe hollow *Viſcera* would be ſufficient for this Purpoſe, without the Addition of any thing from without; and what we obſerve of the youngeſt *Fœtuſes* we can diſſect, having their Stomachs full, (§ 30.) ſeems plainly to point out the Source of the Liquors there to be no other

than that Bowel it ſelf. It would appear to me, that the Contrivance of puſhing the Blood in the deſcending *Aorta*, with the united Force of both *Ventricles* of the Heart (§ 10.) is in part deſigned to promote a greater Secretion in theſe hollow *Viſcera*, where the Reſiſtance to the Effuſion of the Liquors will be leſs than in ordinary Glands.

6. The Quantity of *Mucus* in the Stomach and ſmall Guts, and of the *Meconium* in the great Guts, (§ 30, 31.) is looked upon by ſeveral Writers as a very convincing Argument for the *Fœtus*'s feeding on the Liquor of the *Amnios*; and as a Proof *à poſteriori*, they mention *De Graaf*'s (*a*) Example of a Whelp brought forth without a Head, whoſe Stomach was empty, and in whoſe Inteſtines there was found but a ſmall (*modica*) Quantity of Excrements. 'Tis alſo probable, that a Circumſtance in the ſecond Child, which Mr. *Calder* deſcribes (*b*), may be made uſe of here, *viz.* That having the Paſſage from the Stomach into its Guts ſhut up, there was but a ſmall Quantity of *Meconium* in its great Guts. For it may be ſaid, that *De Graaf*'s Whelp ſhews the Stomach not to furniſh its own Liquor,

(*a*) De mulier organ. cap. 15.
(*b*) Medical Eſſays, Vol. I. Art. 14.

Liquor, but to receive it from the Mouth; and as well as Mr. *Calder*'s Child, had little *Meconium*, becauſe the *Liquor Amnii* was not ſent down into the Guts.

I am ſo far from thinking that the Quantity of Matter ordinarily contained in the Stomach and Guts of a *Fœtus*, is any Argument for Food being furniſhed from the *Amnios*, that on the contrary it appears to me very ſtrong againſt that Opinion; for it is ſcarce to be imagined that the *Meconium* ſhould be the Recrement of any Proportion worth notice of the Food it had during the whole nine Months of Gravidation, ſeeing there is ſcarce more of it than what an Infant paſſes of *fæces* in one Day; and that its Colour evidently diſcovers the Liquors ſecerned within the *Fœtus*'s Body, to compoſe ſuch a conſiderable Share of it.

If *De Graaf*'s Whelp is applied to the Uſe I have made of it, namely, to prove the Stomach incapable of furniſhing any Liquor, becauſe this one was found empty, it will certainly be allowed by every one to prove too much, ſince none can with any ſort of Reaſon ſay, that the Stomach ſecerns no Liquor. But leſt I ſhould be ſaid to extend this Example deſignedly to too general a Concluſion, in order to elude the natural Conſequence, I ſhall give my Opinion of

the Fact as it is related. It is this, That I would blame a faulty Diſpoſition in the Veſſels of that Whelp's Stomach for its Emptineſs, becauſe I ſhall ſoon give poſitive Proof of the Stomach's being capable of furniſhing the Quantity of Liquor commonly found there in *Fœtuſes*, without receiving any thing from the *Amnios*.

It needs be no Surpriſe that there were few Excrements in Mr. *Calder*'s Child, ſince the two great Sources of them were wholly or in part ſtopped. The Stomach ſent nothing down, and the divided *Duodenum* hindered the bilary and pancreatick Liquors to paſs freely.

But to overbalance theſe two Examples, and indeed the general Argument alſo, by poſitive Proof of the Stomach and Guts being able to furniſh their Contents, which muſt be of more Weight than any Negatives can, I ſhall likewiſe mention two Hiſtories; the firſt is, of the Pig, which Dr. *Bellinger* (*a*) deſcribes, brought forth with its Mouth quite ſhut up, but having its Stomach and Guts full of the uſual Contents. The other Inſtance is rather ſtronger; for Mr. *Antoine* (*b* found a glairy yellow Liquor like to Excrements in the Stomach

(*a*) De fœt. nutr. chap. 9.
(*b*) Hiſt. de l'Acad. des ſciences, 1703.

mach and Guts of a Lamb, that had neither Head, Heart, Lungs, Liver nor Pancreas, which I hope will be convincing, that the *Meconium* is no other than the groſſer Parts of the Liquors ſecreted in the alimentary Tube, and of the Bile and *pancreatic* Juice.

Theſe are all the Arguments of any Weight that I know to be advanced for proving the Paſſage of the *Liquor Amnii* into the Stomach. In anſwer to which I have offered Reaſons, which ſeem to me to turn them all in favour of the Side of the Queſtion oppoſite to that for which they were advanced; and therefore I muſt conclude this third *Problem*, by aſſerting, *That the* Liquor Amnii *does not paſs into the Stomach of a* Fœtus.

The CONCLUSION.

SEeing then all the three *Problems* are reſolved, with reſpect to viviparous Animals, ſo as to favour the Nutrition by the Navel alone, allow me to ſum up all by a ſhort Recapitulation of the Arguments which I have inſiſted on at ſo much length.

The *Fœtus* being capable of receiving its whole Nouriſhment by the umbilical Vein alone, whereas none can ſubſiſt without the umbilical Veſſels. —— The Liquor

quor of the *Amnios* being ill calculated in its natural State for the Food of a *Fœtus*; and becoming ſometimes altogether unfit Food in morbid Caſes without the *Fœtus* being any way injured.—— It being highly improbable that a Creature ſhould furniſh its Food out of its own Body, which muſt be the Caſe if the *Fœtus* feeds on the *Liquor Amnii*.——— Seeing it cannot be inferred from any Reſemblance of the Liquors of the Stomach and *Amnios*, nor from any other Appearances, that *that* of the *Amnios* ever is ſent down into the Stomach.——— Seeing no direct Proof can be had of the *Liquor Amnii* being preſſed or ſwallowed down, but on the contrary, all Circumſtances make it probable that it does not go down.—— And ſince all the Phænomena of a *Fœtus* can moſt reaſonably be accounted for, without ſuppoſing the Liquor of the *Amnios* to be any Part of its Food. Is it not reaſonable after all this to exclude the Mouth from the Office of conveying the Aliment of the *Fœtuſes* of viviparous Animals, and to believe that all their Nouriſhment is conveyed by the umbilical Veſſels.

X. *The*

X. *The Sequel of the preceding Eſſay on the Nutrition of* Fœtuſes, *by the ſame.*

I Come now to conſider *How far the Nutrition of the* Fœtuſes *of oviparous Animals, and of Plants, ſerves to illuſtrate or confirm what has been argued for in the preceding Eſſay*; the Plan of which I ſhall here follow; but beg to be excuſed, if inſtead of mentioning only the Facts immediately neceſſary, I take the Liberty to give a ſhort Hiſtory of an Egg, and of the Changes brought on it by Incubation, with an Abſtract of the Formation and Vegetation of the Seeds of Plants. My Reaſons for taking in more Facts than are juſt neceſſary, are, That ſeveral of theſe cannot be rightly underſtood, without a previous Knowledge of others; and in the next Place, I have obſerved that ſuch a Hiſtory of Eggs and Plants as I propoſe to give here, is very little known, notwithſtanding accurate Treatiſes have been wrote on theſe Subjects, which I think may be attributed to their being treated of in a Manner that requires more Study than moſt People are willing to employ in picking out from a-

mong

mong the numerous particular Examples theſe Authors deſcribe, the Facts neceſſary for compoſing an orderly general Syſtem, which is what I aim at here.

Of the Nutrition of the Fœtuſes *of Oviparous Animals.*

TO ſave the perpetual Repetition of my being aſſured of the Truth of each Fact by repeated Obſervations, I ſhall advertiſe you once for all, that unleſs where I expreſly confeſs I had no Opportunity, or neglected to examine them, you'll be pleaſed to believe, that I am obliged to give ocular Demonſtration of what I aſſert.

1. THE Shell of an Egg becomes more brittle by being expoſed to a dry Heat.

2. THE Shell is lined every where with a very thin, but pretty tough Membrane, which dividing at or very near to the obtuſe End of the Egg, forms a ſmall Bag, where only Air is contained.

3. IN a new-laid Egg this *Folliculus* appears very little, but becomes larger when the Egg is kept.

4. THE *Albumen* or *White* of an Egg is contained in concentrical Membranes, but is not all of the ſame Conſiſtence; for the exterior Part of it is thin, and diffuſes itſelf almoſt

almoſt like Water, when the Membranes are broke; whereas its anterior Part is more viſcous.

5. The *White* of an Egg can make its Way through the Shell, as appears from its waſting by keeping, eſpecially if it is expoſed to gentle Heat.

6. The globular *Vitellus* or Yolk would ſeem to be no other than a Liquor incloſed in a Membrane, becauſe whenever the Membrane is broke it runs all out; and it is ſpecifically heavier than the *White*.

7. The *Chalazæ* are two white ſpungy Bodies, riſing very ſmall from oppoſite Sides of the Membrane of the Yolk, but gradually become larger as they are ſtretched out from it in an oblique Direction with regard to the two Ends of the Egg.

8. If we compare the *Chalazæ* to the Extremities of an Axis paſſing through the ſpherical *Vitellus*, this Sphere will be compoſed of two unequal Portions, its Axis not paſſing through its Center; conſequently, ſince it is heavier than the *White*, (§ 6.) its ſmaller Portion muſt always be uppermoſt in all Poſitions of the Egg.

9. The yellowiſh-white round Spot called *Cicatricula* is placed on the Middle of the ſmaller Portion of the Yolk; and therefore

fore, by § 8. muſt always appear on the ſuperior Part of the *Vitellus*.

10. THE *Cicatricula* ſeems to be compoſed of ſeveral Circles of different Colours, and in a fecundated Egg contains the Embryo or Chick, ſee *Malpigh.* (*a*).

11. EGGS whoſe obtuſe Ends are all rubbed over with Linſeed Oil, or ſuch other Subſtances as block up ſmall Pores, are as fit for bringing forth Chickens, when incubated by a Hen, as other Eggs are.

I did not make the Experiment, but can give a Voucher, whoſe ſcrupulous Candour, with ſincere good Wiſhes and Endeavours for the Improvement of Phyſick in this Place, ſome of you muſt be acquainted with, I mean my Father, who beſmeared eighteen Eggs in the manner mentioned; then having put a Mark on them, he ſet them with the like Number of other Eggs, under three Hens, who brought out thirty ſix Chickens, not one Egg of the whole Number failing.

12. AFTER *INCUBATION*, the *Folliculus Aeris* is gradually extended; till, near the Time of the Excluſion of the Chick, it occupies, as near as I could judge

(*a*) De ovo incubat.

Judge, ſome more than a third of the Cavity of the Shell.

13. The extended *Folliculus* does not collapſe, upon being expoſed to the Preſſure of the Atmoſphere, after incubated Eggs are opened (*a*).

14. By Incubation the *Albumen* becomes thinner and more turbid, eſpecially on its upper Part near to the Air-bag, where it is alſo firſt conſumed; and it is afterwards diminiſhed toward the ſharp End of the Egg, till at laſt nothing of it is left except a white cretaceous Subſtance at the lower Part of the Shell.

15. As the Part of the *White* neareſt to the *Cicatricula* is waſted, its Membrane and the *Cicatricula* ſtill approach nearer, till they become contiguous. This Membrane of the *Albumen* is what is commonly called the *Chorion*.

16. Some Time before the *Albumen* is quite conſumed, what remains of it is placed

(*a*) It is ſomewhat out of my Sphere, to enquire how this additional Air gets into the *Folliculus*; but if any are curious enough to make this Enquiry, I would recommend to them, to obſerve how this *Folliculus* diſtends and keeps ſtretched in an exhauſted Receiver of an Air-pump; to exhauſt the Air gradually out of the Shell, while it ſtands expoſed to the Atmoſphere, both while the *Folliculus* is entire, and after it is broke, obſerving always the riſing or falling of the Mercurial Gage. To conſider § 11. and 13. and to conſult Belſini, *De Mot. Cord. Prop.* ix. and *Hale's Statics.*

placed at the lower Part of the Egg, and therefore the Yolk is interpoſed betwixt it and the Membrane, which immediately contains the *Fœtus*, (*See* § 9. and 10.).

17. THE *White* of a fecundated Egg, is as ſweet, and free from Corruption, during all the Time of Incubation, as it is in a new-laid Egg.

I taſted, ſmelled, and ſwallowed the *Whites* of Eggs during all the States of Incubation, both when they were raw and boiled, and conſtantly found it as juſt now deſcribed; and therefore can't imagine how *Bellini* (*a*) could affirm it to have a heavy, abominably-ungrateful Taſte, a ſtinking Smell, and not only to occaſion, when ſwallowed, a troubleſome Senſation in the Stomach and Guts, but to prove purgative. He muſt unluckily have examined none but ſubventaneous Eggs; which is further confirmed by his Deſcription of the ſmall Particles in the colliquated *Albumen*, that reflect Light ſo ſtrongly as the Eye cannot bear it; which I ſaw in ſome ſubventaneous Eggs, but could not obſerve in any that were impregnated.

18. ACCORDING to *Bellini* (*b*) the colliquated *White* always becomes uncapable of

(*a*) De mot. cord. prop. vi.
(*b*) Ibid.

of Coagulation by Heat; but in the Trials I made, it frequently did coagulate, though I found the Succeſs of this Experiment very uncertain; the only general Rule I could fix was, that before the 9th or 10th Day of Incubation, the thinner *White* did not generally coagulate, but after that it frequently did.

19. VERY ſoon after Incubation, the Volume of the Yolk appears increaſed, and by its riſing then nearer to the upper Part of the Egg, one may conclude that its ſpecifick Weight decreaſes.

20. THE Yolk becomes pale and more fluid for ſome Time, eſpecially on the Side next to the Chick, where its Bulk alſo ſooneſt increaſes; but afterwards the Membranes of the Yolk turn firmer and ſtronger, and the Liquor in them is leſs in Quantity, and becomes more viſcous.

21. AS the Chick increaſes, the Yolk is depreſſed in the Middle, and is ſoon brought into a Form ſomething like to a Horſe-ſhoe, in the Middle of which the Chick is lodged.

22. THE Yolk remains freſh and uncorrupted all the Time of Incubation, and is always coagulable.

23. NOT long before the Excluſion of

the Chick, the whole Yolk is taken into its *Abdomen*.

24. The whole *Albumen* and *Vitellus* are not conſumed by the Chick, for ſome Part of the Humours of the Egg eſcapes thro' the Shell, and is not ſupplied by any thing from without; as evidently appears by an Egg's becoming ſo much ſpecifically lighter, as to ſwim in Water after Incubation, though it ſunk in it when recent.

25. The *Chalazæ* remain long without being conſiderably changed, unleſs that they are brought nearer to each other by the creſcent Form of the Yolk, at laſt they degenerate into a dry chalky Subſtance.

26. The *Cicatricula* very ſoon is enlarged by Incubation; and being buoyed up on the Top of the Yolk, to the ſuperior Part of the Egg, it is placed very near to the Air-bag; and when both increaſe, they become contiguous.

27. The *Cicatricula* is called *Amnios*, when it becomes large, and contains the *Colliquamentum* or Liquor in which the Chick is immerſed.

28. The Quantity of the *Colliquamentum* gradually increaſes till the 15th or 16th Day of Incubation; on the 18th it is all conſumed; and in the three following Days ſcarce

ſcarce any Moiſture can be obſerved on the internal Surface of the *Amnios*.

29. The Liquor of the *Amnios* is more clear and tranſparent than the colliquated *White*; its Taſte is more ſalt, and it has no obſerveable Smell. Its Conſiſtence is at firſt a little viſcous, then it becomes more fluid, and afterwards turns a little ropy again.

N. I can ſay nothing of the particular Times when it does or does not coagulate by Heat; for it is in ſo ſmall Quantity during the greater Part of the Time of Incubation, that one can ſcarce gather as much in a Spoon as is fit to make any Experiment with; and, when all the Egg is boiled hard, it adheres ſo cloſely to the *White*, that it is ſcarce poſſible to diſtinguiſh one from the other. *Malpighius* (*a*) ſpeaking of the Egg between the 14th and 19th Day, ſays, "That this thin diaphanous Liquor of the "*Amnios* was ſometimes forced by boil-"ing into a white taſty Subſtance," which my Trials alſo confirmed.

30. The *Allantois* and its contained Urine, are to be ſeen in an Egg, as well as in the *Secundines* of viviparous Animals.

31. Tho' the Heart is among the firſt

(*a*) De ovo incubato.

Parts of the Chick that can be diſtinguiſhed, yet the umbilical Veſſels are ſeen much about the ſame Time that the Heart is obſerved.

I did not enquire into this Fact, but have two very good Vouchers for its Truth, *Harvey* (*a*) and *Malpighius* (*b*).

32. THE umbilical Veſſels gradually diſperſe their Branches upon the *Amnios*, upon the *Vitellus*, and upon the Membranes of the *Albumen:* The Extremities of their much greater Number, being immerſed into the *White*, are extended proportionally as it is colliquated.

33. NEAR to the End of Incubation, the umbilical Veſſels begin to ſhrivel and decreaſe, till at the Excluſion they are very ſmall.

34. THE *Embryo* is ſeen in an Egg at firſt in Form of a ſmall Worm, then its *Carina* or Spine, with the large Prominencies that afterwards ſhew themſelves to be the Brains and Eyes, appear; the other Bowels ſeem hanging from the Spine; the Chaſm of the Mouth diſcovers itſelf; the Extremities ſprout out; the *Viſcera* are gradually covered with the Teguments; and at laſt the Beak, Nails, and Feathers are ſeen: After

(*a*) De generat. animal. exercit. 16. & 17.
(*b*) De ovo incubato.

After which all the Parts become ſtronger and firmer, the proportional Bulk of the Head decreaſing.

For the particular Times when all theſe Changes are thus orderly brought about, conſult *Fabric. ab Aquapendenté*, *Harvey* and *Malpighius*.

35. AFTER all the Parts of the Chick are formed, it is always found lying on its Side with its Neck greatly bended foreward, the Head being covered with the upper Wing, and the Beak placed between the Thighs.

36. WHEN the Shell is opened after the Chick is large and ſtrong, it may be ſeen to bounce and ſpurn, ſometimes opening its Mouth wide, eſpecially if it is ſtirred or pricked.

37. THE Mouth, *Oeſophagus* and *Ingluvies* are always found moiſt, but never contain any Quantity of Liquor that can be collected, or will run out in Drops.

38. THE bulbous glandular Part of the *Oeſophagus* immediately above the Stomach, or what *Peyer* (*a*) calls the *Infundibulum*, and the Stomach, are full of a Liquor in the youngeſt Chick we can diſſect, and continue full the whole Time of Incubation; neither *Infundibulum* nor Stomach having

(*a*) Comment. in anat. ventricul. gallin.

yet got the tendinous Firmneſs they have in Adults; nor can we obſerve the dry pellicle which is ſo eaſily ſeparated from theſe Parts in Hens.

39. THIS Liquor of the Stomach is at firſt thin and more watery; afterwards it becomes curdy, and at laſt is all in Form of a greyiſh white *Mucus*, unleſs that ſome Part of it frequently is coloured yellow or green, by a Mixture of Bile. It always coagulates by boiling, into a firm yellowiſh white Subſtance.

40. THE Quantity of *Fæces* was not large in the great Guts of any Chickens I opened before Excluſion.

41. A little Time before the Excluſion, the Chick may frequently be heard making the ſame pieping Sound that hatched Chickens make. In three Eggs, which were all I opened in this State, the Beak of the Chick had perforated the Membrane of the *folliculus aeris*.

42. THE Shell at the obtuſe End of the Egg frequently appears cracked ſome Time before the Excluſion of the Chick.

43. THE Chick is ſometimes obſerved to perforate the Shell with its Beak, but in thoſe I ſaw tumbling out of the Shell, it was broke off irregularly, at the Place where

where the Membrane of the *Folliculus aeris* was joined to it.

44. AFTER Excluſion the Yolk is gradually waſted, being conveyed into the ſmall Guts by a ſmall Duct; its Membranes gradually contract themſelves, and the Duct becomes ſhorter. On the tenth Day after Excluſion, the *Vitellus* was no larger than a ſmall Pin-head, and the Duct was ſcarce one twentieth Part of an Inch long.

From this Hiſtory of the Egg and of Incubation, I ſhall endeavour to deduce the Manner in which the colliquated White is taken in by the Chick.

Authors generally ſeem to agree, that the oviparous *Fœtus*, while very young, receives its Nouriſhment by the Navel; but ſeveral of the beſt Reputation have been of Opinion, that afterwards it is conveyed by the Mouth. I ſhall examine the Arguments they uſed in Proof of this; and then ſhall ſubjoin ſome negative Reaſons which they have not taken notice of.

Bellini (*a*) has deſcribed the *Cicatricula* or *Sacculus Amnii* with the *Chalazæ* firſt formed in the Back of the Hen; to

(*a*) De mot. cord. Prop. ix.

which, according to him, the *Vitellus* is afterwards joined, and the *White* is acquired as they tumble down the *Oviduct*. He ſays the *Chalazæ* are compoſed of numerous Canals which open into the *Amnios*, and ſend out their Roots into the Cavity of the Yolk, and into the *White*. It is eaſy to conceive what Conſequences may be drawn from this Deſcription, by thoſe who aſſert the Nouriſhment to be carried by the Mouth, *viz.* That here are direct Paſſages into the Cavity where the Chick is, which can take up the Liquors no other way than by the Mouth.

The Anſwer to this Obſervation is the ſame as has been made to the other Facts already quoted from this Author. I deny that the *Sacculus Amnii* is formed before the *Vitellus*; on the contrary, the *Vitellus* is evidently to be ſeen before the *Cicatricula* or *Chalazæ* can be diſcerned. Next, I deny the *Chalazæ* (if they are Canals) to have the leaſt Communication with the *Amnios*, at any Time, or in any State of the Egg, otherwiſe than as they are both adhering to the Membrane of the *Vitellus*, upon which, or within which, no particular Fibres, no Canals are ſtretched to the *Cicatricula*. Every one has it in his Power to examine theſe Facts. If then the

Facts

Facts are denied, the Conſequences cannot be admitted.

Harvey (*a*) affirms, that a Liquor is found in the Mouth and *Ingluvies* of the Chick, which he concludes to be the *Colliquamentum* or *Liquor Amnii* from their Reſemblance, from the Quantity of the Contents of the Stomach, from the Chick's being ſeen to open its Mouth, and from the Neceſſity Creatures are in of ſwallowing, or of forcing back by vomiting, whatever is introduced to the Root of their Tongue.

As to the Reſemblance, I do not ſee how the Compariſon can be made, ſeeing the Liquor in the Mouth and Crop is in ſuch ſmall Quantity, § 37. But ſuppoſe that a ſufficient Quantity was collected, the two Liquors agreeing in ſeveral Properties would not of itſelf be a ſufficient Proof of their being the ſame; and if, for Argument's ſake, the Liquor in the Crop was granted to be in very large Quantity, and to agree in every Property with that in the *Amnios*, it would certainly appear in the ſame Form for ſome Time in the Stomach, whereas it is always found very different there in the larger *Fœtus*, § 39. and *Harvey* confeſſes as much in this Place; therefore it may be con-

(*a*) De generat. animal. exercit. 58.

concluded, that it does not get down into the Stomach.

The Quantity of the Contents of the Stomach and Inteſtines may be accounted for from § 38. applied to what was ſaid on viviparous Animals.

Though Creatures that reſpire are under a Neceſſity of either ſwallowing, or forcing back by vomiting, whatever is introduced beyond their *Fauces*, I cannot think it ſhould be thence concluded, that a *Fætus* is under the ſame Neceſſity; for as it does not exerciſe Reſpiration, it will ſuffer no Inconvenience by a Liquor lodging near to the *Glottis*, whereas Creatures that breathe cannot allow any Subſtance to remain there without Danger of the *Glottis* being ſtopp'd, or of ſuch Subſtances falling down the *Trachæa*, either of which would be of bad Conſequence; which the Creature prevents, by forcing ſuch Subſtances out of ſuch a dangerous Situation.

But to inforce the Negative of the *Colliquamentum* paſſing by the Mouth, obſerve, that there are only three Days in which this Paſſage can moſt probably be ſuppoſed to happen, which are from the fifteenth to the eighteenth Day of Incubation; for, before the fifteenth, the Quantity of the *Liquor Amnii* is increaſing, which

is

is no great Sign of its being ſwallowed; and after the eighteenth this Liquor is not to be ſeen. *Vid.* § 28. If then the *Liquor Amnii* were all ſwallowed between the fifteenth and eighteenth Days, the Stomach ought to be fuller at this Time, and its Contents ſhould be thinner, more pellucid, *&c.* like to the *Colliquamentum*; which I aſſure you does not happen. Beſides, if we ſuppoſe the Power of Digeſtion ſo ſtrong as to expel this Liquor as faſt as it is taken down in theſe three Days, it would certainly follow that this powerful Digeſtion, continuing in the three ſucceeding Days, while there is no Liquor to be ſwallowed, the Stomach ought to be quite emptied, which every one, who opens the Stomachs of Chickens at this Time, will ſee it is not. And, *laſtly*, As a more direct Proof ſtill againſt *Harvey*, I broke the Shells of ſeveral incubated Eggs, while the *Colliquamentum* was in large Quantity; and before the *Amnios* was opened I ſaw the Chickens open their Mouths very wide ſeveral Times, but could not obſerve the Quantity of the Liquor in which they lay any way leſſened. I afterwards carefully diſſected the Chickens, and found no other than the common ſmall Quantity in the Crops, and the ordinary curdy *Mucus* in the Stomach,

which

which ſeems to me a Demonſtration that they do not ſwallow.

After ſuch convincing Proofs, it will be needleſs to make any Application of the Arguments in the former Part of this Eſſay to this Subject; and therefore I ſhall only deſire your Readers to compare the Poſture of a Chick, and of a Hen while ſhe ſwallows Liquors, that they may ſee the Poſture of the Chick's Neck to be moſt unfavourable to the Suppoſition of Deglutition being performed; and then ſhall conclude with a very ſhort Hiſtory of Incubation, aſſigning what I imagine to be the moſt probable Reaſons of the ſeveral Appearances.

By the Heat of the Hen, or of Stoves equal to it, aſſiſted poſſibly by the Action of the Air contained in the *Folliculus aeris*, (§ 2, 3, 12.) the *Albumen* becomes thinner, eſpecially where it is moſt expoſed to theſe Forces, (§ 14.) and the *Vitellus* in the ſame manner becomes ſpecifically lighter, (§ 19.) and therefore readily riſes in the White; and as, by being divided into two unequal Portions by its Axis the *Chalazæ*, it preſents the ſmaller Portion to the incubating Heat at firſt, (§ 8, 9.) ſo the Change in conſequence of Incubation being ſooneſt and moſt produced here, (§ 20.) and the

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Cicatricula being enlarged at the ſame Time, the ſmaller Portion of the Yolk becomes of the leaſt ſpecifical Weight; and therefore is buoyed up to the ſuperior Part of the Egg, whereby the *Folliculus aeris*, and Membranes of the *Cicatricula* become contiguous when they enlarge, (§ 26.) and the *Vitellus* can never be in hazard of compreſſing the tender Embryo; and the umbilical Veſſels are ſituated ſo as to have their Extremities immerſed in the Liquors, that firſt undergo the proper Change, for being imbibed by their Orifices, (§ 32.)——— The Incubation continuing, the *White* is ſtill more and more colliquated, and the umbilical Veſſels are proportionally extended, the Veins to abſorb it, and the Arteries to throw out any Particles that are unfit for the Chick till they are farther prepared, but eſpecially to drive forward the Liquors in the Veins, as was explained in the Account of the viviparous Animals, (§ 20.)——— When the *White* in the upper Part of the Egg is exhauſted, its Membranes become contiguous to the *Amnios*, (§ 15.) and thereby the Membranes involving the *Fœtus*, become ſufficiently ſtrong to reſiſt the Motions of the Chick, when its Eaſe or Safety prompt it at any Time to ſpurn.——— The Powers of Incubation a-

bove.

bove-mentioned, aſſiſted by the Pulſation and conquaſſatory Motions of the numerous umbilical Veſſels ſpread on the Yolk, (§ 32.) diſſolve that Humour more, and render ſome Part of it fine enough to be taken up by the ſmall Extremities of the umbilical Vein, ſome of which penetrate its Membrane; by which the Liquor at laſt becomes thicker, (§ 20.) and the Membrane being in part emptied, will more eaſily yield to the Weight of the Chick; and is preſſed into the Form of a Horſe-ſhoe, (§ 21.) while the Net-work of Veſſels extended on this Membrane, render it ſtronger and firmer.——The *Folliculus aeris* not only aſſiſts in colliquating the *Albumen*; but when the Humours of the Egg come to occupy a leſs Space, by eſcaping through the Shell, (§ 24.) and by being changed into the ſolid Subſtance of the Chick, the *Folliculus* enlarging, (§ 12.) keeps the Chick and Humours ſteady, without the Danger of being diſordered and broke by the Motions of the Egg.——Branches of the umbilical Veſſels being diſtributed to the *Amnios*, (§ 32.) the Arteries will pour out their Liquors into its Cavity in greater Quantity than the Veins can take them up, as long as the *Fœtus* is weak; but whenever the *Fœtus* becomes ſtronger, and

and conſequently, the abſorbent Power of the Veins increaſes, (*vid.* § 15 of former Eſſay) they will take up the Fluid of the *Amnios* faſter than the Arteries pour it in, and its Quantity will be diminiſhed till it is quite exhauſted, (§ 28 and 29.)——This Abſorption will go on more ſpeedily in Proportion alſo to the umbilical Veſſels being leſs diſtended with *Albumen*, whereby there is leſs Reſiſtance to the progreſſive Motion of the abſorbed Liquors; which probably is the Reaſon of the *Colliquamentum* being all taken up between the fifteenth and eighteenth Days.——By the conſtant Circulation and Renewal of all theſe Humours of the Egg, they keep freſh and uncorrupted in a fecundated Egg, (§ 17 and 22.) but corrupt ſoon in a ſubventaneous one, or in ſuch whoſe *Fœtus* dies in the Time of Incubation.——Where-ever Veſſels are not ſufficiently filled, they contract themſelves; and therefore, the *Albumen* being exhauſted in the laſt Days of Incubation, the umbilical Veſſels gradually ſhrivel, (§ 33.) which prevents the Danger of a Hæmorrhagy when the Chick is ſeparated from its Membranes. But as the *White* is not ſufficient at this Time fully to ſupply the Chick, the Yolk is taken into its Body, (§ 23.) and being there preſſed,

ſed, it is thrown gradually by the proper Duct (§ 23 and 44.) into the Guts, to ſupply that Defect. —— The Veſſels and Glands which open into the alimentary Tube, ſeparate at leaſt as much Liquor as will moiſten it; and the Stomach having no callous ſtrong Cruſt on its internal Surface, (§ 38.) will ſeparate more than it can do in the Adult; and in the mean time the Glands of the *Infundibulum* pour out a Liquor that is always thicker as the Chick increaſes, till it becomes a very thick white *Mucus:* And therefore the Contents of the Stomach of the *Fœtus* in the Egg muſt have the Appearance deſcribed § 39, and will be ſlowly paſſing off into the Inteſtines. —— The Shell at the obtuſe End of the Egg becoming more brittle, by being ſo long expoſed to a dry Heat, (§ 1.) and the Membranes loſing their Toughneſs when their Moiſture is exhauſted, the Chick very eaſily tears them, and breaks off that End of the Shell, to make its Way into the common Atmoſphere. —— The Mother having no Juices prepared within her Body, to give the Chick for Food after it is hatched, and its Organs for taking in and digeſting Aliment being for ſome time too weak to ſupply it ſufficiently with Nouriſhment, the *Vitellus* is made to ſupply

theſe

theſe Deficiencies, till the Chick is ſufficiently confirmed and ſtrong, (§ 44.) after which it is no longer the Subject of my preſent Enquiry.

Of the Nouriſhment of Plants while in a Fœtus *State.*

THe firſt eight Numbers of the following Facts are taken from Mr. *Geoffroy* (*a*), and all the others, except one or two Obſervations of my own, are collected from *Malpighius* (*b*).

1. FLOWERS contain the male and female Organs of Generation of Plants.

2. THE male Organs are ſmall Bladders, (the *Apices*) full of a very fine Duſt, each Particle of which is of a particular diſtinguiſhed Form in each Species of Plants.

3. WHEN this Duſt or *Farina* is ſufficiently ripe, the Bladders break with an elaſtick Force, and throw the Duſt from them.

4. THE female Organ is the *Stylus*, *Piſtillum* or *Tuba*, conſiſting of ſeveral Canals, which are open and wide at one Extremity; but in the other, neareſt to the

(*a*) Mem. de l'Acad. des ſciences, 1711.

(*b*) Anat. plant. cap. de ſeminum generat. & in tractat. de ſem. veget.

Stalk of the Plant, terminate in one or more Cavities where ſmall roundiſh *Ovula* are contained.

5. BOTH Organs of Generation are contained within and protected by Leaves of different Make and Colour in different Plants, which Leaves are generally called the *Petala* of Flowers.

6. SOME Flowers contain both the male and female Organs, and therefore are called *Hermophradites*; others only contain one or the other Kind, and thence are named *Male* or *Female*.

7. THOSE Flowers which are only male or only female, either grow both from the ſame Root, or the Male only grow on one Plant, and the female upon another of the ſame Species; from which ſuch Plants are ſaid to be male or female.

8. WHEN the male *Farina*, or Duſt, is prevented from having Acceſs to the female Organs, either the *Ovula* do not increaſe into Seeds, or if they do grow, they are deformed, do not contain any *Germ* or *Rudiment* of the young Plant, and are not prolifick.

9. WHEN the fecundated *Ovula* increaſe, the *Germ* or young Plant of each is ſeen lodged in a pulpy Subſtance named the *ſeminal Leaves*, which again adhere to, and fre-

frequently are ſunk ſome way into a Depreſſion of a Membrane, which forms a little Bag for containing a Liquor, and therefore this Bag is called the *Amnios*.

10. FROM this Side of the *Amnios*, oppoſite to that where the *Germ*, with its *ſeminal Leaves* is fixed, a Tube (the *Umbilicus*) goes out to be continued to the *Uterus*.

11. BEFORE the *Umbilicus* reaches the *Uterus*, it paſſes through a Cavity formed by another Membrane that is full of Liquor, or contains a great Number of ſmall Veſicles diſtended with Liquor, and therefore is compared to the *Chorion*.

12. THE *Chorion* and *Amnios* become more and more turgid with Liquors for ſome Time; but then the Liquors begin to diminiſh, the *Chorion* being ſooneſt emptied, and the Navel-ſtring ſhrivels away till it can no longer be obſerved.

13. IN the mean Time the *Germ* and *ſeminal Leaves* increaſe apace.

14. AT laſt all the Liquors in the *Chorion* and *Amnios* are conſumed, their Membranes contract and ſhrivel, the Seed is ſufficiently large and confirmed; the ſmall Peduncle, by which it adheres to the *Uterus*, ſhrivels, turns hard and brittle, and the Seed falls off with the leaſt Force.

15. THE Seed is compoſed of its Membranes or Teguments, of a large farinaceous Part, and of the ſmall *Germ* joined to the farinaceous Subſtance by a ſmall Peduncle, which is inſerted into the *Germ* between the *Caulis*, *Stalk* or *Plume*, and the *Radicle* or ſmall Root of this young Plant.

16. THE *Germ* is evidently the young Plant where the *Plume* and Root may plainly be ſeen.

17. WHEN the fecundated Seed is ſowed at the proper Seaſon, the farinaceous Subſtance ſoon becomes ſofter, and the *Germ* ſtretches its Stalk upwards, and its Root downwards.

18. THE farinaceous Subſtance either remains under Ground, turning larger for ſome Time, but having its Subſtance changed more and more into a milky Liquor, or it is extended upwards, in Form of one or two pulpy juicy Leaves: From theſe different Forms which this farinaceous Subſtance takes, it is called the *Cotyledons*, *ſeminal Leaves*, or *Lobes*.

19. AFTER ſome Time the *Lobes* begin to ſhrivel, and to have their Liquors conſumed, and at laſt, when their Juices are all waſted, they fade away and fall off.

20. THE Plant grows very faſt all this Time.

21. WHEN

21. WHEN the *Cotyledons* are taken off before the Plants are put into the Earth, ſcarce any of them will vegetate, and all periſh very ſoon.

22. THOSE that advance any, after being thus deprived of their *Cotyledons*, increaſe rather in their *Plume* than Root.

23. WHEN the *ſeminal Leaves* are taken away, after allowing the Plant to vegetate ſo far as to come above Ground, it periſhes in a little Time, the Roots generally fading firſt.

24. IF the *Cotyledons* are taken away later, moſt of the Plants die, and thoſe that continue to grow are always very ſmall.

25. WHEN one *Cotyledon* is only taken away, the Plants do grow, but are not near ſo large or ſtrong as the others that are left intire.

26. BY taking away the *Plume*, when it firſt ſprouts above Ground, the Roots grow very large and quickly.

To fix an Analogy here between Animals and Plants, it will be neceſſary to determine how long either of them ſhould be ſaid to remain in the State of a *Fœtus*, which, in my Opinion, ought to be underſtood ſo long as the young Creature is nouriſhed ſolely by Liquors furniſhed by the *Uterus* of the Parent;

rent; but as ſoon as it is ſupplied any other Way, with all or any Part of its Nouriſhment, it can no longer be looked on as a *Fœtus*.

If this is agreed on to be the diſtinguiſhing Character of a *Fœtus*, it will be evident that we are only to regard Plants as *Fœtuſes*, while the Seed is ripening, and before the Earth, Water, Moiſture of the Air, *&c.* have communicated immediately any Matter for its Increaſe; and in this Caſe it will appear moſt probable, That the *Umbilicus* pours in Liquors from the *Uterus* and *Chorion* into the *Amnios*, from which it is taken up by the Veſſels of the ſeminal Leaves, to be conveyed partly into the *Fœtus*, and partly into the Leaves themſelves, by which the Plant is increaſed and its Parts are explicated, and a Subſtance is provided for nouriſhing it afterwards, when its tender Roots either can receive from the Earth very little, or any thing leſs than is neceſſary for the ſufficient Growth of the Plant.

In running this Analogy between Animals and Plants, you'll obſerve a Mixture of the Mechaniſm of the viviparous and oviparous Animals in the Nouriſhment of the *Fœtuſes* of Plants; for the little Plant having, a in the viviparous Animals, a Communication with the *Uterus* of the Parent till

it

it is fully formed, the whole Quantity of the Liquor it is to be nouriſhed with, is not at firſt to be ſeen, as the Albumen is in the Egg; but the *Uterus* furniſhes the Liquor to be gradually abſorbed by the *Cotyledons* or *Placenta:* And then on the other Hand, Plants reſemble the oviparous Animals, in ſo far as the Parent being uncapable of ſupplying any Juices, prepared in its own Body after the *Fœtus* is ſeparated from the Womb, for the Nouriſhment of the Plant; and the young Plant not being in Condition for ſome Time to ſubſiſt entirely on the new Nouriſhment it muſt receive; the farinaceous *Cotyledons*, or pulpy ſeminal Leaves do the ſame good Office to the Plant, as the *Vitellus* does to the Chick after it is hatched.

Since the Reſemblance is ſo great between Animals and Plants, it would be ſuperfluous, after what has been ſaid of the former, to enter into a particular Detail of the Reaſons of the foregoing *Phænomena* of Plants; and it is almoſt needleſs to ſay that I would conclude both the oviparous Animals and Plants to favour my Opinion of the whole Nouriſhment of all *Fœtuſes* being conveyed by particular abſorbent Veſſels, and not by the ordinary Canals, through which the Aliment muſt paſs, after

the Creature is out of its *Fœtus* State; for theſe are obvious to any who reads theſe Eſſays with the leaſt Attention.

XI. *Practical Corollaries from the Eſſay on the Nutrition of the* Fœtuſes *of viviparous Animals, by the ſame.*

BEING conſcious to what Length the Eſſay on viviparous Animals had run out, I did not intermix any Account of morbid *Phænomena*, with the Deſcription of the Parts, or with the Arguments concerning the Nouriſhment of the *Fœtus*, which alſo would have had the bad Effect of diverting the Reader's Attention from the principal Deſign; but conſidering how much ſuch *Phænomena* may ſerve to explain, and poſſibly confirm ſome Part at leaſt of my Reaſoning; and knowing how ill any thing that is not practical goes down with ſome People, I beg to be ſtill further indulged, while I bring a few Examples to ſhew that the Knowledge of the Structure of the Parts is abſolutely neceſſary for underſtanding the Nature of Diſeaſes; and that all Theory is not meer idle Speculation, but that Reaſon and Experience united, lay the

the ſureſt Foundation of the Practice of Phyſick, (*See* Art. XXV. *of firſt Volume.*)

I. SEEING the Veſſels of the Womb and of the *Placenta* do not anaſtomoſe, (§ 16.) and Women have an erect Poſture, and are ſubjected to periodical Evacuations from their *Uterus*, which has larger Canals opening into it, than are to be obſerved in other Animals, (§ 2, 3, 4, 5.) we may underſtand how much more liable Women are to ſuffer Abortions, than the Females of other Creatures are; for the Contents of the impregnated human *Uterus* preſs more on the Orifice of the Womb to force it open, the ſuperfluous Quantity evacuated periodically at other Times, is apt to thruſt off the *Placenta*, and being poured into the Cavity of the Womb, either corrupts there, or forces open the *Os Uteri*; both which will probably occaſion the Loſs of the *Fœtus*: Whence Women much more ſeldom conceive immediately before the *Menſes* are to flow, than ſoon after that Evacuation is paſſed. Thence alſo we underſtand why *Looſening*, as the Women call an Appearance of Blood from the *Uterus*, is a Symptom that diſcovers great Hazard of Abortion.

II. NATURE endeavours to provide againſt the Inconveniencies mentioned in the pre-

preceding Paragraph, by making the *Placenta* adhere ſooner to the human Womb than is ordinary in other Creatures; and by furniſhing the human *Fœtus* with a larger proportional *Placenta*, whereby the Adheſion is ſtronger, and on both Accounts the Evacuation is prevented.

III. When there is the largeſt Quantity of the ſuperfluous Liquors collected, the ſtrongeſt Puſh muſt be given to ſeparate the *Placenta* from the Womb; but the *Menſes* are generally ſtopped after Pregnancy, and the Child is too ſmall for ſome Months to conſume them; wherefore Women are moſt expoſed to Abortions in the third or fourth Month of their going with Child.

IV. We ſee what Diſorders are brought frequently on Women at each Period when their *Menſes* are about to flow, and what Miſchiefs almoſt conſtantly attend their Obſtructions; and therefore need not be ſurpriſed at the Fainting, *Nauſeæ*, Reachings to vomit, *&c.* that ſo often attack Women in their firſt Months of Pregnancy, ſome of which help to remove and prevent other Diſorders; for by the Vomiting, for Example, not only an Evacuation is made, but leſs Chyle muſt be ſent into the Blood-veſſels, which therefore will have leſs of the ſuperfluous Liquors. This again teach-

es

es us to remove or mitigate ſuch Symptoms when they become very violent and dangerous, by proper Evacuations.

V. Since the Separation of the *Placenta* from the Womb muſt ſo evidently produce Abortion, we may ſee that this may be occaſioned by very different Cauſes, operating in various Manners, and requiring very different Treatment in preventing the Loſs of the *Fœtus*, when our Advice is asked timely.

1. Whatever occaſions too great a Quantity of Blood to be ſent to the *Uterus*, or aſſiſts or increaſes its *Momentum* to thruſt off the *Placenta*; ſuch as plentiful Living, Compreſſion of other large Veſſels, Frights, violent Exerciſe, Shocks of the Body, Fevers, *&c.* will bring a Woman into Danger of Abortion. The Cure however is plainly pointed out, to wit, Blood-letting, mild Food in ſmall Quantities, and Reſt.

2. When the Adheſion of the *Placenta* to the Womb is too weak, and the *Os Uteri* does not make a ſufficient Reſiſtance to its own Dilatation, whether theſe depend on the ordinary general Conſtitution of the Body, or on a particular Diſpoſition of the Womb, or on a ſudden Relaxation, as in Fainting, the ſame bad Effect, Abortion, may ſtill follow; but the Cure muſt be very

ry different from what is to be uſed in *N.* 1. For here we muſt rely on Corroborants; and though much Exerciſe is at firſt to be ſhunned, yet if the Patient can by Degrees be brought to bear moderate Exercile, it will aſſiſt the other Medicines conſiderably.

3. If the *Sinuſes* of the Womb are allowed ſuddenly to collapſe, by the Want of a large enough Quantity of Liquors to diſtend them, as by the neceſſary Supplies to the Blood being withheld, or by violent Evacuations, eſpecially Loſs of Blood, not only the Weakneſs mentioned in *Numb.* 2. may follow; but the Veſſels of the *Placenta* which have not been proportionally emptied, will be diſingaged from the Excretories of the *Sinuſes*, by their being deprived of ſufficient Space to lodge in, and there is great Danger of Abortion. In ſuch a Caſe we are to be on our Guard not to apply ſmart Stimulants to rouze the languid Mother too haſtily; for ſuch Medicines increaſe the Con raction of the Veſſels of the *Uterus*, and will drive off the *Placenta* ſoon; but we ought to repair the Quantity of her Blood by mild balmy Food, with a Mixture ſometimes of the leaſt irritating Cordials.

4. All Cauſes that can produce a ſtrong Con-

Contraction of the Fibres of the *Uterus*, or of the Parts that can preſs upon it, as for Inſtance, of the Diaphragm and abdominal Muſcles, will be in Danger of forcing away the *Placenta*, and of opening the *Os Uteri*, whereby Abortion is occaſioned. Therefore ſharp Pains in any Part of the Body, and eſpecially in or near to the *Uterus*, rough Emeticks, ſharp acrid Purges, *Teneſmus*, Strangury, Piles, or ſuch like, are every Day bringing on Abortion. The radical Cure is certainly to remove the Cauſe of the Pain or Irritation, which muſt be done by Medicines adapted to its particular Nature and Seat, which are too numerous to be mentioned here. If this cannot be executed ſo ſoon as we would deſire, we are to leſſen its bad Conſequences as much as poſſible, by blunting its Violence, and counteracting its Effects. The firſt of theſe Indications will principally and moſt ſpeedily be purſued in moſt Caſes, (except perhaps in the inflammatory ones) by giving *Opiates*. The ſecond Intention is anſwered by diminiſhing the *Momentum* of the Blood, which Venæſection effectually does, and is always uſeful in the inflammatory Caſes; but is not ſo proper in ſome other Circumſtances, where however the *Opiates* generally anſwer our Intentions.

VI. The

VI. The Liquors ſent into the *Fœtus* by the umbilical Vein not having their propelling Force communicated from the Mother (§ 16.), the State of the Mother's Pulſe cannot affect the Child otherwiſe than by occaſioning Abortion, or vitiating the Fluids that are to be abſorbed; and therefore we may be convinced, how vain it is to pretend to account, in a phyſical Way, for the Impreſſions ſaid to be made on Children by the Imaginations of the Mothers. We may hence alſo ſee, that Children may be infected with the diſeaſed Juices of the Mother, but that it is poſſible for them to eſcape catching the Diſeaſes of their Mothers, if either they are only topical, without affecting the whole Maſs of Fluids, or even when the Mother's Blood is ſpoiled, the Child may be free of her Diſeaſe, if the morbid Particles are ſuch as the Placentary Veſſels cannot abſorb. This you ſee is in ſome Senſe giving theſe Veſſels a Power of chuſing good or bad.

VII. The *Placenta* is largeſt proportionally in the youngeſt *Fœtuſes* (§ 18.), by its being leſs capable of yielding to the ſtretching Power of the Contents of the *Uterus*, than the membranous Parts of the Secundines are; and thereby it is better calculated

culated for the greater proportional Growth of the *Fœtus* when young.

VIII. THOUGH the Surface of the *Placenta* is not extended proportionally to the Increaſe of the *Fœtus*, yet the Orifices of the *Sinuſes* ſeem to keep up to that Proportion (§ 5.), therefore the Surface of Contact between the *Uterus* and *Placenta* rather decreaſes than turns greater; and a greater Quantity of Fluids is applied to that Surface. Which may be one Reaſon why the After-burthens of ripe Children are brought away more eaſily than thoſe of Abortions.

IX. BY being acquainted with the muſcular Structure of the *Uterus* (§ 6.) we come to know how the *Placenta* ſeparates more eaſily after the Child is born, than while it is yet contained in the *Uterus*; for as long as the Child remains there, the Womb is hindred to contract, upon which, and the want of a muſcular Contraction in the *Placenta*, the Separation of the After-burthen depends. And ſince the Degree of Contraction of the *Uterus* will be proportional to the Diſtraction of its muſcular Fibres, as happens in all Muſcles, we may ſee another Reaſon why the After-burthens of Abortions are more difficultly brought away than thoſe of ripe Children; and we may

may obſerve, how reaſonable the Uſe of *Pulv. ad Partum*, or other cordial ſtimulating Medicines, is, in ſuch Caſes, to haſten this Contraction, when there is not ſome ſtronger Contra-indication, ſuch as Fever or Inflammation, to forbid their Uſe.

X. The *Sinuſes* of the human Womb (§ 3.) are much more ſafe and uſeful than any continued arterious Canals could have been; for theſe would have occaſioned too great a *Hæmorrhagy* when the *Placenta* was ſeparated, whereas, in the Way the ſmall Branches of the Arteries are diſpoſed upon the membranous Sides of the *Sinuſes*, they muſt be compreſſed as ſoon as the *Uterus* contracts, and at the ſame time the Reſiſtance, which the Womb occaſioned to its own returning Blood, by its Preſſure on the large Veins, being taken off when the Womb collapſes, the lateral Branches of the minute Arteries can be very little diſtended with Blood, and the *Sinuſes* will be very little filled. To illuſtrate this, remark a very analogous Caſe, the oedematous Swellings of the Legs in Women with Child, which go off as ſoon as they are delivered. Hence we may be convinced, that the only Means whereby we can ſave a Woman's Life whoſe *Placenta* ſeparates before Birth is, to deliver her immediately

ly. And hence it is plain, why the *Lochia* or Cleanſings gradually diminiſh in Quantity, and loſe their red Colour.

XI. SEEING the Reſiſtance to the Blood in the deſcending *Aorta* is taken off upon Delivery, and that not only the *Placenta* ſeparates with more Difficulty when the Womb has not contracted itſelf, but alſo a greater *Hæmorrhagy* muſt happen, it will appear no Wonder that weak Women ſhould be ſo liable to faint at this Time, eſpecially if they have been kept in an erect Poſture, and the Midwife is too anxious to bring away the *Placenta* ſoon. Hence we ought to learn to deliver ſuch lying in a Bed, or on a Couch; and the *Uterus* ought to be allowed ſome Time to contract; and the Mother ought to have Time given her to recover the Fatigue of her Throws, before the After-burthen is brought away. Hence alſo we may be convinced, how neceſſary ſoft Compreſſion by Bandage is on the Belly after Delivery.

XII. WHEN the Quantity of the Mother's Blood is ſmall, or when the Contraction of the *Uterus* is very quick, or when an Obſtruction happens in the Arteries of the *Sinuſes*, the *Cleanſings* will be in very ſmall Quantity. The Conſtitution of the Patient, and the State of the Pulſe readily

diſcover what the Want or too ſmall Quantity of the *Lochia* depend on; and in the firſt Suppoſition there is no Harm from this Stoppage, but we do Miſchief if we attempt to force them; but in the other Caſes we ought to encourage this Evacuation by ſoft relaxing internal Medicines, and by Injections, Fotuſes, *&c.* applied to the Womb, or near it, while other Evacuations are promoted or made, if the Symptoms become urgent.

XIII. The Liquor of the Stomach being ſo thick (§ 30.) while all the digeſtive Powers of a Child are very weak at Birth, we may eaſily underſtand what bad Conſequences, ſuch as its ſticking to the Guts, obſtructing the Orifices of the Lacteals, *&c.* may be produced by this *Mucus* remaining there; and therefore ought to admire the Wiſdom of our Creator, who has provided ſuch a thin diluent purgative Milk at this Time, for preventing theſe Diſorders, and may hence learn how neceſſary it is to cleanſe the *primæ viæ* of new-born Children by proper Medicines, eſpecially when they are not ſuckled by their Mothers, and have not a Nurſe whoſe Child is as young as themſelves.

XIV. The Want of Reſpiration to ſqueeze foreward the Bile, and the Reſiſtance

ſtance made to its Entry into the Guts of *Fœtuſes*, by the tough Slime which lines the inteſtinal Tube, make the Effuſion of their Bile very ſlow; and therefore their Gall-bladder is generally full of a green ſharp Bile. Hence at Birth, or ſoon after it, Children are often obſerved to have the *Jaundice*, the thick Slime producing the ſame Effects in them, as is diſputed for from Stones in *Art.* XXXIII. of your firſt Volume. This Jaundice generally yields to any gentle Purgative, and very often is carried away by any Medicine that increaſes the Contraction of the Guts; which is no more than might be expected from underſtanding the Cauſe of the Diſeaſe. It is alſo from this Collection of Bile during Geſtation, that Children are ſo frequently ſubject to Gripes and green purging ſoon after Birth, which cleanſes their Guts of the unneceſſary Slime and *Meconium*, and diſcharges that ſharp Bile, which might bring on Diſorders of worſe Conſequence if it continued to lodge there: So that however troubleſome it may be to the innocent Babes, they are generally the better for it afterwards.

XV. FROM the Care bountiful Providence is at, not only to ſupply a ſufficient Quantity of nouriſhing Juices to the *Fœ-*

tuſes of Animals and Plants, but alſo to furniſh Subſtances prepared by the Mother's Organs, for ſerving them after they are ſeparated from her, *viz.* Milk in the viviparous, the Yolk in the oviparous Animals, and the farinaceous Subſtance of the Seeds in Plants: And from what we obſerve of Brutes, who follow the Dictates of Nature more cloſely than Man does, how they only gradually come to uſe the common Food of their Parents, we may be convinced that the Food, provided by Nature, Milk, is the moſt proper for Infants; that a ſudden Change of Food is dangerous to ſuch tender Creatures, and that therefore the Food given Children when they are to be weaned from the Breaſt, ſhould be ſuch as is neareſt to Milk, and the Breaſt ought to be taken only by Degrees from them. By which Method I have often prevented all the troubleſome Diſorders which generally attend Weaning.

XVI. From what was remarked above, (§. IV.) of the Diſorders Women are frequently ſubject to when their *Menſtrua* are about to flow, we may rationally conclude that a Nurſe, who has ſuch a Redundancy of ſuperfluous Liquors, will have her Milk changed to the worſe. And from what all Practiſers in Phyſick have obſerved of the Effects

Effects of deriving a more than ordinary Quantity of our Juices to one Part, in order to make a Revulſion from another, we have Reaſon to think that a Nurſe, whoſe *Menſes* are brought on by any other Cauſe than a Superfluity of Liquors, will come not only to have leſs, but alſo worſe Milk after ſuch an Evacuation; and therefore a Nurſe who menſtruates ought not to be choſen. But if particular Circumſtances oblige us to continue a Child with ſuch a Nurſe, we ought to conſider the Cauſes that occaſion her *Menſes* to flow, and according to theſe we are to order the Child to be kept up from the Breaſt, either before the Evacuation in the firſt Suppoſition, or for ſome Time after it, when it has been brought on by any other Cauſe.

XII. *The* Brain *forced by Coughing through the Cicatrice of a Wound of the Head, where a conſiderable Piece of the* Cranium *had been taken out; by Mr.* JAMES JAMIESON *Surgeon in* Kelſo.

SOME Slates falling from the Roof of a Houſe four Stories high, upon the Head of a Girl about thirteen Years of

Age, broke and ſhattered her *Cranium* at the Place where the ſagittal and coronal Sutures meet, making a Depreſſion of the Bone of about four Inches Diameter. The Symptoms attending this Accident were common, *viz.* an univerſal *Stupor*, blooding at the Noſe, Difficulty of Breathing, with a full irregular Pulſe. I immediately took twelve Ounces of Blood from her Arm; and ſent for all the Phyſicians and Surgeons of this Place, who agreed to trepan her ſpeedily, which I performed. When I endeavoured to raiſe the depreſſed Pieces of Bone, they were all found ſeparated from the neighbouring ſound Bone, and therefore were all brought away, and ſo left a terrible Chaſm in the *Cranium*. The *Dura Mater* was covered with a *Syndon* dipped in *Mel. Roſar.* with a little Tincture of *Myrrh.* Pledgets wet in the Tincture were applied to the *Cranium*, and the other common Dreſſings were put on. Being laid in Bed, an emollient Clyſter was injected, and procured two plentiful Stools; and before Night ſhe recovered the Uſe of her Tongue, and all the other Parts of her Body, except the left Arm, which continued in a paralytick State for eight Days.

She was kept at a low Diet; and the Cure went very ſucceſsfully on, and was com-

compleated ſo far in three Months, that the Teguments were cicatrized.

On the fifth Day after her Wound, I had cauſed a Plate of Lead to be made for covering all the Dreſſings, and kept it on all the Time ſhe was under my Care, with two Pieces of broad Tape put through four Holes, one on each Side of the Plate before, and the other two behind, tying the Ends under the lower Jaw, and behind the *Occiput*.

Notwithſtanding the Wound being skinned over, I recommended the conſtant Uſe of the Plate of Lead laid over a Compreſs upon the Cicatrice, to ſupply the Want of Bone; and ſhe kept it on two Months after I left off ſeeing her; but then thinking herſelf ſecure, ſhe laid it aſide, and continued well ſeven Months more, when the *Kink-cough*, (*Tuſſis convulſiva*) then epidemick in this Place, ſeized her; and was ſo violent one Night when ſhe was in Bed, that the Cicatrice in her Head was lacerated, and the Brain was puſhed out at the Teguments. Being inſtantly called for, I found above two Ounces of the Brain lying on the Scalp: After cleanſing this away, I applied Dreſſings with the Plate of Lead over them, thereby preventing a greater Diſcharge.

The Symptoms that followed this direful Accident were an intire *Paralyſis* of the Limbs, ſhe retaining ſtill the Uſe of her Reaſon and Tongue, but much inclined to Sleep, with a low depreſſed Pulſe and *Anxietas Cordis*, and her Urine was diſcharged involuntarily. In this Condition ſhe continued five Days, and then died. Her Friends did not allow any Inſpection into the State of her Brain after Death.

This Girl's Caſe will teach us how little we need be ſurpriſed at tormenting Headachs being brought on by frequent violent Coughing, when the Brain muſt be ſo ſtrongly preſſed on the *Cranium*.

We may likewiſe learn, from the unhappy Accident that occaſioned this Girl's Death, to be very careful to ſupply any Part of the *Cranium* that is wanting, eſpecially after the Bones of it are ſo firmly joined as to prevent their yielding, and thereby enlarging the Cavity within them.

Since I did not open the Body, I can pretend to aſſign no Cauſe, why the Parts furniſhed with Nerves from the *Medulla Spinalis* ſhould have been ſo much affected with Pally in the five laſt Days ſhe lived, while ſhe retained her Speech and Senſes, contrary to what might have been expected.

XIII. *The Cure of an Ulcer in the Cheek, with the ſuperior ſalivary Duct opened; by* Alexr. Monro *Profeſſor of Anatomy in the Univerſity of* Edinburgh. *vid. Vol. 3. p. 277.*

MR. *Ker* of *Frogton*, a young Gentleman of a delicate Conſtitution, and threatned with a Conſumption from an Ulcer in his Lungs, was ſeized, after riding in a cold Night, with a very hard Tumor about the Middle of his left Cheek; which the Gentlemen who attended him endeavoured at firſt to reſolve, but obſerving a Suppuration to come on, it was opened with a Lancet on the Inſide; and afterwards an external Orifice was alſo made, and Eſcharoticks were applied to waſte down the hard Stool of the Tumor that ſtill remained. When no more Hardneſs was felt, his Surgeon endeavoured to incarn and cicatrize, but was diſappointed by a conſtant plentiful Diſcharge of a thin clear Lymph. The Orifice was again enlarged, and it was dreſſed a conſiderable Time with Adſtringets and Driers in different Forms, but without any Succeſs.

In

In *September* 1727, being accidentally in the Neighbourhood of *Kelſo*, where Mr. *Ker* lived, I was ſent for thither, to adviſe with Drs. *Abernethy* and *Scot*, Phyſicians there, and with Mr. *Jamieſon* Surgeon, concerning his Cure. The external Orifice in his Cheek was as large as would have received the Point of my Thumb, and at the Bottom of it we could diſtinctly ſee ſome Part of the ſuperior ſalivary Duct laid bare, with a Hole in the Outer-ſide of it, large enough to allow the Button of a middle-ſized Probe to enter it; and when he moved his lower Jaw at our Deſire, the *Saliva* ran out plentifully at that Orifice. When the Jaw was not moved, a very ſmall Quantity of the Spittle ouzed out; but in Time of Dinner, it made a Napkin, laid eight-fold over the Plaiſter that covered the Ulcer, wet all through.

We agreed to make an artificial Opening for the *Saliva* into his Mouth, which I did in the following Manner: Having with two Fingers of one Hand ſtretched his Cheek outwards, I directed the Point of a large Shoe-maker's Awl, which I held in the other Hand, into the open Breach of the Duct, and thruſt the Awl obliquely forewards through the Cheek, into the Mouth, betwixt my two Fingers; then draw-

drawing back the Awl, I paſſed an eyed flexible Probe, mounted with a ſmall Cord of Silk, through the Paſſage made by the Awl, and brought it out between his Lips with my Fingers, leaving one half of the Cord hanging from the external Ulcer; then the Ends of the Seton being diſengaged from the Probe, were tied looſely near the Angle of the Mouth; and his external Ulcer was dreſſed up with dry Lint kept on with a Plaiſter. He was deſired to rinſe that Side of his Mouth frequently with Brandy; and the Sides of the external Ulcer were kept from growing out too faſt or turning callous, with the lunar Cauſtick. In leſs than three Weeks this Management had the deſired Effect of rendring the Paſſage, in which the Cord was engaged, callous, (which the looſeneſs of the Cord, and the want of Pain when it was drawn plainly ſhewed;) when Mr. *Jamieſon* took out the Cord, and cured up the external Ulcer very ſoon. In a little Time after I ſaw our Patient here in *Edinburgh*, with a firm Cicatrice on the Part where the Sore had been.

This Operation is plainly directed by my Friend Mr. *Cheſelden* in theſe Words (*a*), "When

(*a*) Anatom. Book iii. chap. 3.

" When this Duct is divided by an exter-
" nal Wound, the *Saliva* will flow out on
" the Cheek, unleſs a convenient Perfora-
" tion be made into the Mouth, and then
" the external Wound may be healed."
See *Vol.* III. *Art.* 13.

My Succeſs in this Caſe has encouraged me to attempt ſome Improvements in analogous Operations, which I ſhall probably communicate to you hereafter.

XIV. *A remarkable Extravaſation of Blood after the Operation for the* Hydrocele; *by Mr.* James Jamieson *Surgeon in* Kelſo.

A Gentleman about ſixty Years old was afflicted with a *Hydrocele* in the left Teſticle, which obliged him to have the Operation performed annually for four ſucceſſive Years. I made the Perforation with a ſmall diſſecting Scalpel, and evacuated twenty three Ounces of Water each Time, applying aromatick and aſtringent Medicines to the *Scrotum*, with a proper ſuſpenſory Bandage, and recommending ſtrengthning Diet and internal Medicines after

after ſome Doſes of Purgatives. But he commonly neglected all the Preſcriptions in a few Days after the Operation, and lived in an irregular enough Way.

In two or three Minutes after the Water was evacuated, when I performed the Operation the fourth Time, about twelve Ounces of pure liquid Blood ran out at the Orifice in a full equal Stream, as from a large Vein, without the ſmalleſt Complaint of Pain or other Uneaſineſs; and then the *Hæmorrhagy* ceaſed of itſelf, with no other Aſſiſtance than blooding him plentifully at the Arm, and the Dreſſings applied in the former Operations.

He informed me next Morning, that he felt a great Weight and Fulneſs in that Teſticle, and all the Way from it up to his Groin; and upon taking off his Dreſſings, the *Scrotum* appeared bigger than at any Time of the *Hydrocele*. In a Conſultation with two Phyſicians, Drs. *Cranſton* and *Scot*, it was agreed that I ſhould make a large Inciſion in the *Scrotum* upwards from that made for the *Hydrocele*, to diſcover the State of the *Tunica vaginalis* and Teſticle. When I had made a Wound about two Inches long, we diſcovered the *Tunica vaginalis* of a natural Colour and Texture, but very greatly diſtended, and therefore

fore determined to make our Inciſion thro' it alſo, having previouſly prepared all the Dreſſings for Caſtration, leſt we ſhould be obliged to perform that Operation. As ſoon as the *Tunica vaginalis* was cut, a great Quantity of thick coagulated Blood fell out, and by putting my Finger all round the *Tunica albuginea*, and upwards towards the Rings of the abdominal Muſcles, I brought out a good deal more. Having then cleaned the Parts with an armed Probe dipped in warm Claret, we ſaw the Teſticle, its Veſſels and proper Coats in a ſound Condition, which, with the Want of any *Hæmorrhagy*, and the *Tunica vaginalis* contracting itſelf quickly, gave us Hopes of making a Cure without any further Operation. I applied Pledgets dipped in Claret Wine mixed with *Mel roſ.* to the Teſticle, and covered the reſt of the Wound with Pledgets, on which common Digeſtive, with a ſmall Proportion of *Balſ. Peruvian.* were ſpread. Over which I put the Dreſſings formerly uſed in the *Hydrocele*. His Phyſicians confined him to a ſtrict cool Regimen, and gave Directions for Evacuations by Blooding, Clyſters, or for cordial Juleps, *&c.* as his Circumſtances might require.

His Cure went on in the ordinary Way, with-

without any troubleſome Accident, and was compleated in three Weeks; the *Tunica vaginalis* growing every where ſo firmly to the *Albuginea* or proper Coat of the Teſticle, that he had not the leaſt Appearance of the *Hydrocele* during the three Years he lived after this Cure. The Cauſe of his Death was a Fever attended with an *Aſthma*.

Quær. How or from whence this great Quantity of Blood had been extravaſated?

XV. *A Hiſtory of the Operation for an* Aneuriſm *of the Arm, ſucceſsfully performed by Mr.* JOHN MACGILL *Surgeon in* Edinburgh.

THE *Aneuriſm* is a Diſeaſe which chirurgical Writers pretend to deſcribe with great Exactneſs, and to relate the ſeveral Symptoms by which the different Species of it are diſtinguiſhed; while the particular Hiſtories of this Malady, handed down by Obſervators, are ſo few and unaccurate, that of late the Nature, Seat, and Symptoms of at leaſt the true Kind, have afforded Matter of Diſpute, which can only

ly be determined by a Number of Observations. In the following Case I had a good Opportunity to remark exactly the Progress, *Phænomena* and Structure of what was judged by all the Physicians and Surgeons who saw it to be a *true Aneurism*; and therefore believe an Account of it will neither be unacceptable to you, nor improper to be inserted among the other Papers of your Collection.

James Forrest a Coachman, forty Years of Age, a heal strong Man, being thrown from the Coach-box, broke the Bones of his Right Leg into a great many small Pieces; and a Gangrene coming soon on, there was a Necessity to perform the Amputation in the country Place where he then was. The third Day after this Operation, he was let Blood of by a young Surgeon there, who opened the *Basilic* Vein of the Right Arm. The Patient felt a very sharp pricking Pain, while the small Incision was made with the Lancet; and four Days after, he observed a Tumor about the Bigness of a small Cherry at the Wound, which he believed to be the common one of coagulated Blood, called by Surgeons *Thrombus*; and therefore did not mention it to the Gentleman who performed the Amputation.

On

On the twelfth Day after his unfortunate Fall, he was carried to Town, and received into the *Infirmary*, where the Cure of his Stump went on as well as could be wiſhed, without any Accident or Symptom to retard the Cure. After he had been eight Days in the Hoſpital, he told the Phyſician and Surgeon then attending, that he had ſome Uneaſineſs from a Swelling at the Bending of his Elbow. When it was examined, a Tumor appeared of an oval Form, as big as a ſmall Hen-Egg, ſituated behind the *Baſilic* Vein. The Skin over this Tumor was of a natural Colour; no Pulſation could be felt; and it adhered as firmly to the Tendon of the *Biceps* Muſcle, as *Ganglions* commonly do to Tendons. Two Days after, a Pulſation, exactly ſynchronous to that of the Arteries, was diſtinctly ſeen and felt. When the Tumor was ſtrongly preſſed, it ſeemed to be leſs, but could never be made to diſappear. There was ſcarce any Pain at this Part, either in moving his Fore-Arm, or when the Tumor was handled.

A Conſultation of ſeveral Phyſicians and of all the Surgeons who attend the Infirmary being called, the Diſeaſe was unanimouſly determined to be a *true Aneuriſm*; but the Patient being ſtill weak, it was re-

ſolved to try the Effects of artful Compreſſion, and to delay the Operation till the Patient had Strength enough to undergo it, unleſs the Tumor ſeemed before that to be in Hazard of burſting. Graduate Compreſſes wet in *Oxycrate* were therefore applied, with the proper Bandage, which at firſt had an exceeding good Effect in diminiſhing the Tumor; but it ſoon after began again to increaſe: And then ſeveral Machines, ſuch as that with a Screw for the *Fiſtula lacrymalis*, Mr. *Petit*'s *Tourniquet*, *&c.* were uſed, but without any Succeſs; on the contrary, the Tumor ſtill increaſed, and the Skin began to inflame; and a ſmall Suppuration was brought on the moſt prominent Part of it. By laying aſide theſe more forcible Machines, and returning to the Uſe of the former Compreſſes and Bandage, after covering the ſmall ſuperficial Ulcer with white Ointment, the Inflammation went off, and the Ulcer cured. The Tumor was now all firm and hard, ſcarce yielding at all to Preſſure, except at that prominent Point where it was ſoft, and where only the Pulſation could be felt, when the Fore-Arm was bended: When the Member was extended, no Pulſation could be obſerved any where in the Tumor.

The

The Patient was not yet ſufficiently recruited, and therefore the Operation of the *Aneuriſm* was ſtill delayed: But to prevent any Danger from the ſudden burſting of the *Aneuriſm*, the *Tourniquet* was kept conſtantly applied to the Patient's Arm.

In the Beginning of *January* 1733, the Patient was judged to be ſtrong enough to ſuffer the Operation, and the Tumor increaſed ſo faſt, that there was great Danger of the Teguments yielding ſuddenly; and therefore the Operation was not to be delayed any longer. This happening to be the Month of my Attendance, I was of Courſe to perform, but previouſly brought all the Surgeons of the Hoſpital together, to examine the State of the Tumor, and to determine the Method to be followed in operating.

The Tumor was of a very great Bulk and Height, its Baſe extending internally as far as the internal Condyle of the humeral Bone, and externally it had puſhed the Tendon of the *Biceps flexor cubiti* as far as the *celaphick Vein*: It aſcended about three Inches along the internal Side of the *Biceps*, and deſcended as far below the Joint of the Elbow, being alſo conſiderably prominent forward.

Being uncertain whether this Tumor

was formed without the Artery, or if it was the Body of the Artery dilated, we determined to do the Operation in the moſt cautious, though more tedious Way, *viz.* by Diſſection, having alſo all the Inſtruments and Dreſſings for an Amputation ready, in caſe there was no Hope of Succeſs from the Operation of the *Aneuriſm*.

Having applied the *Tourniquet* in the common Way to prevent any *Hæmorrhagy*, the Skin was pinched up about the Middle of the Tumor, and cut with a Biſtory; then a ſmall Directory being puſhed into the fatty cellular Membrane, firſt upwards, then downwards, and to each Side, I cut upon it with a Biſtory, and thus made a crucial Inciſion on the whole Extent of the Tumor. After which I diſſected the four Angles of the Teguments from the Tumor with a convex-edged Scalpel, ſtitching a cutaneous Artery that would otherwiſe have been uneaſy to me. The Tumor thus laid bare, appeared covered at its upper Part with a thin cellular Membrane, but below it ſeemed to have a very ſtrong tendinous like Coat, which we ſoon diſcovered to be no other than the *Aponeuroſis* of the *biceps* Muſcle; after ſeparating with my Fingers the Adheſion this had to the Tumor below it, I cut it through to the

loweſt

oweſt Part of the *Aneuriſm*, which now was all bare and full in View. The Coat of it was only a very thin tender Membrane, which appeared eroded, as well as the firm Subſtance it contained, at that prominent ſoft Part, where, as I mentioned before, the Pulſation was only to be felt. In endeavouring to ſeparate the Tumor from the adjacent Parts with my Fingers, its tender Membrane was eaſily torn in ſeveral Places; and therefore, without inſiſting on ſuch a Separation, I opened the Membrane from one End to the other, when ſeveral Ounces of a blackiſh grey-coloured Liquor, like to Coffee made of half-burnt Beans, ran out, and ſeveral Pieces of coagulated grumous Blood, and of *polypous* Concretions, fell down to the Floor. What remained was one large *polypous*-like Subſtance that weighed ſix Ounces, below which ſome Spoonfuls of that blackiſh Liquor, mixed with pretty pure Blood, were taken out with a Spunge. There were no Bridles or fleſhy Beams ſtretched tranſverſely from one Side of the Cavity to the other; but the humeral Artery, involved in all its Coats, came fully in View. About the Middle of the bare Part of the Artery we ſaw a Hole, large enough to receive the largeſt Surgeon's Probe, without any

retorted Lips, or other Sign of the interior Membranes having been extended through the exterior, but exactly of the ſame Appearance as if it had been made by an oval ſharp-pointed Inſtrument. After by unlooſing the *Tourniquet* a little, we had made ſure of what we ſaw being the wounded Artery, one of the Gentlemen who aſſiſted me put in a ſtrong Probe by the Orifice, and with it raiſed the Artery ſo, that I eaſily paſſed the *Aneuriſm-needle*, with proper Thread, behind the Artery, both above and below the Orifice, without engaging the Nerve or Vein within the Thread. I made the two Ligatures in the common Way, the Patient complaining much of Pain while I tied the ſuperior Threads, and then untwiſting the *Tourniquet*, only ſome few Drops of Blood ouzed out at the Aperture in the Artery; and the other common Dreſſings and Bandages were applied.

The *polypous* Lump we took out was very hard and firm on the Side next to the Skin, except where I ſaid already it was eroded in the Middle; but turned ſofter in a *lamellated* Way as it approached the Artery, till it degenerated gradually into mere coagulated Blood.

During half an Hour after the Dreſſings were

were applied, the Right Hand remained cold and ſcarce ſenſible, but gradually then recovered Senſe and Heat. Next Day that Hand was a little ſwelled, and on the ſecond Day became ſo big, as to oblige me to take off the thick Compreſs that was preſſed on the humeral Veſſels by the exterior Bandage; after which, and fomenting the Hand with warm Water and Brandy, the Swelling decreaſed.

On the fifth Day after the Operation, the Dreſſings were removed, and the Wound began to ſuppurate in a very right Way, and was cured intirely before the End of *March*, without any Accident, unleſs that on the 22d of *January* Blood made its Way through all the Dreſſings: It had come out from the Hole of the Artery, but ſtop'd as ſoon as the Dreſſings were removed; and no *Hæmorrhagy* ever happened afterwards. In the Time of the Cure, the Hand often became *oedematous*, and ſometimes a gentle *Eryſipelas* attacked the Skin of it, but ſoon yielded to an Embrocation with the *Aq. Mindereri*, or to *Aq. Calcis*, with ſome Brandy. The Threads with which the Artery had been tied did not come out till the Middle of *March*.

We never could feel any Pulſe below the

Elbow ſince the Operation. The Member is weak, but he can perform the Motions of the Fore-Arm, Hand and Fingers. He ſtill complains of a Numneſs and Difficulty of Motion in the Thumb and Fore-Finger more than in any of the reſt, though it is now two Months ſince the Wound was skinned over.

N. *The Pulſe after ſome Months more returned to the Wriſt, but the Numneſs and Feebleneſs of the Thumb and Fore-Finger remained.*

XVI. *REMARKS on the Coats of Arteries, their Diſeaſes, and particularly on the Formation of an* Aneuriſm; *by* Alexr. Monro *Profeſſor of Anatomy in the Univerſity of* Edinburgh.

THE curious and accurate Account of the *Aneuriſm*, which was ſhewn to me before it was ſent you by a Gentleman, to whom I ſtand indebted for many obliging Acts of Friendſhip; and Mr. *Macgill*'s Deſire that I would endeavour to explain the Nature of this Diſeaſe, which appears neither to have been exactly examined, nor rightly underſtood by chirurgical

Wri-

Writers, have given Riſe to the following Remarks on the Coats of Arteries, their Diſeaſes, and particularly on the Formation of the *Aneuriſm*; and as a Sequel to this, I ſhall ſoon lay before you ſome Figures of the Arteries of the Arm, accompanied with a few Reflexions on the *Aneuriſm* occaſioned by Venæſection, which is by much the moſt frequent that admits of any Cure.

In ſeveral Parts of the Body, Arteries receive a ſtrong firm Covering from the contiguous Parts, which has been deſcribed as their exterior Coat, ſuch is, the Membrane that ſurrounds the *Aorta*, as it comes out of the *Pericardium*; the *Pleura* and *Peritonæum* ſpread over the deſcending *Aorta* in the *Thorax* and *Abdomen*, *&c.* But ſeeing this Coat is only to be obſerved in ſome Parts. where particular Purpoſes are to be ſerved, ſuch as ſtrengthning an Artery, where it is more than ordinary expoſed to the ſtretching Force of the circulating Fluids, counteracting the Reſiſtance made by ſome ſolid Body on its oppoſite Side, ſaving it from Compreſſion, *&c.* I think it ought not to be conſidered when we ſpeak of the Coats of Arteries in general.

All Arteries are covered externally with a cellular Subſtance, compoſed of very fine pellu-

pellucid Membranes, which are capable of being ſtretched, even ſuddenly, to a great Extent without breaking; and they collapſe as quickly when the ſtretching Force is removed. There is always more or leſs of an oily Liquor contained in the communicating Cells of this Subſtance, and the proper Veſſels of the Arteries run in it, ſpreading Branches every where on the Cells for the Secretion of that Oil. When either the Membranes are diſtended by a Liquor thin enough to enter the Cells, or when the exterior Part of the Membrane is gently drawn, the cellular Texture is very evident; but when a groſs Subſtance is forced into the more internal Part of this cellular Membrane, it conceals the fine Threads of the Membranes mixed with it; and whenever the Cells are empty, they collapſe ſo cloſe together, that the whole appears to be one membranous Coat, conſiſting of ſeveral Layers.

All Arteries are ſurrounded with ſuch a Subſtance as I have juſt now deſcribed; and therefore it may be reckoned one of their Coats; tho' I muſt obſerve, that the ſame kind of cellular Subſtance is common to, at leaſt, all the flexible Parts of the Body, where every little Fibre is connected to another by the ſame Contrivance. See

Boer-

Boerhaave's Preface to hi Edition of the *Autores varii de morbo Gallico.*

This cellular Subſtance of the Arteries ſerves to connect them to the ſurrounding Parts, without hindering or diſturbing their Actions or Motions; it prevents their being ſo readily compreſſed; it gives a ſafe Paſſage to the Veſſels of their other Coats; it contains Oil for lubricating and keeping the interior Coats flexible.

What really deſerves to be called the firſt proper Coat of the Arteries, is the muſcular or tendinous, which, in the human Body, at leaſt, conſiſts of annular Fibres connected ſtrongly together. It is to theſe principally that the recoiling of an Artery is owing, after it has been diſtended by the ſuperior Force of the *Syſtole* of the Heart, and the Elaſticity of the Subſtance connecting the annular Fibres, which is of the cellular Kind, is very remarkable in the quick Contraction of an Artery, after it has been ſtretched longitudinally.

The moſt internal Coat of Arteries cannot be rightly obſerved while they are ſound and recent, becauſe it is ſo thin, and adheres ſo firmly to the muſcular Coat, that it appears in Form of a very thin Layer of longitudinal Fibres; but after the Arteries are kept ſome Time, and their Tex-

ture

ture becomes more eaſily unravelled by the beginning Putrefaction; it ſeparates very eaſily, and ſhows numerous Inequalities on its interior Surface, with Veſſels diſperſed on it, and a cellular Subſtance is ſeen connecting it to the muſcular Coat, but there is no Appearance of any muſcular Structure in it, and it tears very ſoon upon attempting to diſtract or ſtretch its Fibres; ſo that it would ſeem to bear a very ſtrong Reſemblance and Analogy to the villous Coat of the Inteſtines, whoſe proportional greater Diſtenſions and Contractions above what Arteries ever ſuffer, and thicker *tunica cellularis interna*, will account for the *Papillæ* and *Rugæ*, ſo much more obſervable in the Guts than the Arteries. I ſuſpect it muſt be this Coat which Mr. *Winſlow* (*a*) calls the *Duvet*, which he affirms he ſaw filling up the Cavity of the ſmall ſecerning Arteries of the Glands, and on which he builds his Account of Secretion. I imagine it a Membrane analogous to this, which, diveſted much of its cellular Subſtance, forms the Valves in the Veins.

This interior Coat will prevent any Particles of our Fluids from inſinuating themſelves

(*a*) Mem. de l'Acad des Sciences, 1711.

ſelves into the cellular Subſtance of the other Coats, it renders the Surface of the Arteries more ſmooth and poliſhed than otherwiſe it would be; and we may conclude from the Analogy of other Parts, that its Veſſels ſeparate a Liquor to protect and lubricate its own interior Surface.

From the Texture of the external cellular Coat of Arteries, as above explained, it is evident, that Obſtructions are very apt to be formed here, which, according to the different Series of Veſſels in which the Obſtruction is, and the different Natures of the obſtructed Liquors, will produce various Diſeaſes, as well as in the *Tunica cellularis* elſewhere in the Body, which is the Seat of numerous Diſeaſes that are ſaid by Authors to affect other Parts. To take but one Example of the many which *Boerhaave* (*a*) names, here it is that Inflammations are placed, this it is that melts down into *Pus* in all Suppurations. Let Surgeons reflect whether ever they ſaw the proper muſcular Fibres diſſolved into *Pus*, or if firm Membranes, Ligaments, the Skin, *&c.* do not caſt off in Sloughs when they are eroded. Let thoſe who examine the

(*a*) Præfat, in autores de morbo Gallico.

the Bodies of People dead of Pleuriſies, inflamed Guts, *&c.* remark whether the Membranes ſaid to be affected are not intire, and the *Pus* is not collected in the cellular Subſtance under the Membrane. But to return to the preſent Subject, the Diſeaſes of the external cellular Coat of Arteries may ſerve to diminiſh the Diameter of the Artery, if they compreſs it. If the Oil in the Cells becomes too thin, or only Lymph is contained in them, the muſcular Coat may be too much relaxed. If there is too ſmall a Quantity of the moiſtning Liquors, the Artery loſes that Flexibility that is neceſſary for it; and if the morbid Matter becomes acrid, it may erode or deſtroy the muſcular Coat, though this will be done with Difficulty, becauſe of its firm Texture. Hence we daily ſee large Arteries long ſoaked in the *Pus* of Abſceſſes without any *Hæmorrhagy*.

The muſcular Coat will be ſubject, as well as other Muſcles, to too great Rigidity or Laxity, to convulſive Contractions, or paralytick Affections, though theſe will not ſhew themſelves evidently, becauſe of the Action of the Heart upon the Artery, and of the Elaſticity which this Coat has, independent of the Circulation.

What was ſaid of the Texture of the moſt in-

internal Coat, will naturally lead one to think that it muſt be ſubject to Diſeaſes, and that theſe will be much a-kin to the Maladies of the external cellular Coat, Allowance only being made for the violent Compreſſion which the internal one muſt always ſuffer, from the impetuous Stream of Blood on one Side, and the brisk Re-action of the muſcular Coat on the other ; the Effects of which may be readily enough underſtood from what I have had Occaſion to ſay elſewhere (*a*) on ſuch Compreſſion. It is in this interior Coat only that ever I ſaw any of the bony or calculous Concretions of Arteries. I have more than once obſerved the Cavity of a large Artery almoſt blocked up by a ſteatomotous Thickning of this Coat, and frequently I have obſerved purulent Matter collected in it.

Notwithſtanding the morbid State of this Coat offers itſelf ſo frequently to the View of thoſe who diſſect the human Body, practical Authors and Obſervators have not been at Pains to remark how far the animal Oeconomy was thereby diſturbed, I offer the few following conjectural Queries to their Conſideration. May not Diſeaſes here often occaſion great Inequalities and

(*a*) Accounting for Oſſification in the Anatomy of the human Bones, Part I.

and Irregularities of the Pulſe? May not a *Tabes purulenta* have its Seat here, without any Bowel being affected? Will not a ſmall Eroſion of this Coat, and a conſequent ouzing of the Blood through the cellular Texture of the other Coats, more naturally account for the *Ecchymoſes* that happen ſo frequently in Diſeaſes, where the Blood is acrid, than breaking of the Veſſels can do? Are not the ſmall Veſſels, where the Motion of the Fluids is ſloweſt, more liable to ſuffer this Eroſion than the larger ones are?

The preceding Account of the Coats of Arteries may let us ſee that no *Aneuriſm* can happen, unleſs through ſome Fault of the interior Coats; therefore it will be neceſſary to take a View of the ſeveral Ways theſe Coats may be ſo vitiated, as to give any Chance for the Formation of an *Aneuriſm*.

1. A large Opening made into an Artery, with a proportional Aperture in the Teguments, produces only a *Hæmorrhagy*; but if the external Orifice in the Skin is ſo ſmall, as not to allow the Blood to eſcape as faſt out at it, as it flows from the Artery, the neighbouring cellular Membranes will ſoon be filled with Blood; the Member becomes every where ſwelled and diſcolour-

coloured; and, in ſhort, what is generally called a *Baſtard Aneuriſm* is formed.

2. If the Aperture into the Artery is very ſmall, and the Blood cannot eſcape through the Teguments, it will coagulate before it can be puſhed to any conſiderable Diſtance from the Orifice by which it eſcaped, and thereby an Obſtacle will be made to the ſucceeding Blood's ſpreading in the *Tunica cellularis*, which ſoon will be formed into a lamellated Membrane, by the Oil being ſqueezed out, while the extravaſated Blood becomes firmer and harder, ſo as to appear of the *Polypous* Conſiſtence, by the Preſſure it ſuffers. I had ſometimes Occaſion to be much ſurpriſed at ſeeing how ſoon ſuch a Change can be brought on the arterious Blood; the Inſtances I mean are, where after a Limb was amputated, the Patient's Faintneſs hindered the Arteries to ſpring as uſual, by which one lay undiſcovered, and was not ſtitched, but in a few Hours after the Dreſſings were put on, occaſioned a *Hæmorrhagy*, notwithſtanding the Bandages had been tightly applied, and a Prentice preſſed ſtrongly with his Hand on the End of the Stump. When the wet Dreſſings were removed, I ſaw the clotted Blood on them become firm, of a pale Colour, and having the Appearance

of a fibrous Texture. Since then ſuch coagulated Blood is contained in a membranous Subſtance, the Diſeaſe, in the Caſe we have ſuppoſed, will have the Appearance of a circumſcribed incyſted Tumor, which the Pulſation of the neighbouring Artery and the Jett made at its open Orifice will communicate a Pulſation to, till either the Bulk of the Swelling, the Quantity of Liquor below the *Coagulum*, or the great Reſiſtance of the Parts ſtretched on the Tumor, render the Vibration imperceptible; and till once the Polypous Concretion turns very large, the Tumor will become much leſs on compreſſing it ſtrongly, by the fluid Blood being forced back into the Artery through the Perforation in its Coats; that is, a Tumor, attended with all the Symptoms of what is called a *true Aneuriſm*, is formed, though the principal Part of the ordinary Definition, *viz.* the Diſtenſion of the proper Coats of the Artery is wanting.

3. If the muſcular Coat only is perforated, the interior Coat will be puſhed out at the Interſtice of the divided Fibres, and not being capable of being ſtretched far without breaking, the Caſe is ſoon reduced to one or other of the two former Suppoſitions.

4. If

4. If part of the muſcular Coat only has ſuffered a Solution of Continuity, the remaining Fibres are either able to reſiſt the Force of the Blood without being diſtracted beyond their natural Tone, in which Caſe, they will reunite, eſpecially if they have been divided by a ſharp Inſtrument cutting tranſverſely; but when there is Loſs of Subſtance, or a longitudinal Inciſion, the Breach can only be made up by *Syſſarcoſis*; but in neither Caſe will either ſort of *Aneuriſm* happen, unleſs more Fibres afterwards yield to bring it to be no longer able to reſiſt the impetuous Blood, as I think would for moſt part follow, from what I have ſeen in trying ſome Experiments for obſerving what happens in an Artery taken out of the Body, when it is filled with Quick-ſilver and preſſed, after ſome of the muſcular Fibres have been cut or broke. If either then the Fibres continue to break gradually, or the Diſtenſion of them is ſudden, when all are torn, the Diſeaſe is reduced to the Suppoſition made in § 1. and 2.

5. When Part of the Fibres are broke, cut or eroded (any of which ways you may conceive the Solution of Continuity to be made on all the Suppoſitions yet mentioned) we can imagine ſuch a Proportion to remain intire, as being very near, but not

altogether able to reſiſt the Fluids, will yield very gradually, and form a true *Aneuriſm*, in the Senſe the common chirurgical Books explain it: But beſides the many Chances againſt ſuch a preciſe Approach to an *Equilibrium* happening between a leſed Artery and its contained Liquor, I muſt obſerve, that though Membranes become ſtronger and thicker as they are gradually ſtretched; yet muſcular Fibres ſeparate more and more, leaving larger Interſtices: And therefore, if the annular Fibres of an Artery were thus ſeparated, the interior Coat would ſoon yield in their Intervals, and the Blood would burſt out to form one or other of the Tumors deſcribed § 1. and 2. and when it is confined, as in § 2. the circular Fibres would appear like ſo many Columns or croſs Bars in the Tumor; which agrees very well with ſeveral Deſcriptions of *Aneuriſms* handed down to us.

6. If a ſmall Part of the muſcular Coat of an Artery loſes its natural Tone, or contracting Force, by any paralytick Diſorder, it will yield to the ſtretching Force of the Blood; and thus an *Aneuriſm* may be formed, which will have all the Characters of what is commonly named a *true Aneuriſm*. You ſee, that a partial Palſy, and that

that very gradually coming on, muſt be here ſuppoſed; otherwiſe the Fibres being ſeparated, and the internal Coat breaking, will reduce it ſoon to the State mentioned in § 5. and indeed it would appear from what is there ſaid, that before it becomes of any very conſiderable Bulk, we have Reaſon to judge the ſame would happen here. Beſides, ſuch a Palſy as has been here ſuppoſed will very rarely be formed, becauſe of the great Sympathy and Connection which the whole arterious Syſtem has, the pulmonary Artery and *Aorta* making each one hollow Muſcle continued from the Heart to their ſmall Ramifications: And I believe a Palſy is ſeldom or never obſerved to affect only one Extremity, or the Middle of a Muſcle, while the other Parts of it continue to be vigorous and active.

7. The only Suppoſition we need make concerning the interior Coat of Arteries alone being affected is a Solution of its Continuity, which will readily happen by all ſudden over-ſtretching of an Artery, or it may be made by any eroding Cauſes, ſuch as Suppuration, *&c.* I cannot ſay poſitively, that the Want of this Coat is capable of producing an *Aneuriſm*, but ſhall offer a Conjecture, which may poſſibly be improved afterwards by Obſervation; it is

this, When this Coat is removed, ſome Particles of our Liquids may inſinuate themſelves into the cellular Membrane connecting the muſcular Fibres, and gradually enlarging theſe Paſſages, at laſt penetrate through it, and are diffuſed in the external cellular Coat: And thus at length this Caſe is reduced to what is mentioned toward the Cloſe of § 5. I was brought into this way of thinking, partly by obſerving how readily cellular Membranes tranſmit Liquors, and by ſeeing Air eſcape through all the other Coats of the Guts when the villous one is removed.

From the whole we may ſee, that what Authors call now-a-days a *true Aneuriſm* will very ſeldom be formed; which may be ſtill further confirmed, by mentioning the remoter Cauſes which are agreed on by all to occaſion it for ordinary, theſe are, Wounds, Bruiſes, Straining, loud Laughing, Crying, *&c.* All ſuch you ſee make a ſudden violent Effort on the Arteries, and therefore do not rightly anſwer to any of the Suppoſitions we made of the Manner this Diſeaſe could poſſibly be brought on. And to eſtabliſh what you ſee I argue for, of the true *Aneuriſm* being a very rare Diſeaſe, I peruſed a conſiderable Number of Hiſtories of *Aneuriſms*, beſides thoſe men-

mentioned by Dr. *Freind* (*a*), and could not find above two or three that were diſſected, ſo much as alledged to have been true *Aneuriſms*; and there was not one, where it is ſaid that the *aneuriſmal Sac* conſiſted of ſtrong annular muſcular Fibres, which muſt however be the true Criterion whereby the true *Aneuriſm* can be known, ſeeing from what was ſaid in § 2, confirmed by ſeveral accurate Hiſtories, Blood extravaſated in the *Tunica cellularis* will have all the other Symptoms that are deſcribed as proper to the true *Aneuriſm*.

(*a*) Hiſtory of Phyſick, Vol. 1.

XVII. *Reflections on the* Aneuriſm *occaſioned by Blood-letting*; *by the ſame.*

THE Figures herewith ſent will give a better Idea of the Situation and Courſe of the Arteries of the Arm that are the Subject of the following Reflections, than any Words can; and therefore I ſhall not trouble you with any verbal Deſcription, but ſhall proceed to the Explication of *Table* II.

Fig. 1. represents the most ordinary Distribution of the humeral Artery.

1. A Part of the *pectoral* Muscle.
2. The *Biceps flexor cubiti.*
3. The *Coraco-brachialis* Muscle.
iv. The *Brachiæus internus.*
4. The *Brachiæus externus.*
5. The *Brevis* and *Longus Extensor.*
6. The *Pronator radii teres.*
7. The *Supinator radii longus*, and *Extensor carpi radialis* drawn outwards by a Thread.
8. The *Supinator radii brevis.*
9. The *Flexor carpi radialis.*
10. The common Origin of the *Palmaris longus* and *Flexor carpi ulnaris.*

A The Trunk of the *humeral Artery* giving off Branches in its Course to the neighbouring Muscles.

B The Place below the Joint of the Elbow, where it is about to split into its two large Branches.

C The *radial* Branch.

D The common Trunk of the *ulnar* and *median* Arteries.

E A Branch going off from the *humeral* Artery above the Elbow toward the internal *Condyle*, behind which it anastomoses sometimes by a large Canal with a Branch sent up from the *Ulnar*, oftner they communicate

municate by a great many ſmall Branches, and frequently I could not diſcover any Conjunction of theſe two Arteries.

F The Part of the *humeral* Artery, where it commonly begins to be covered by the *Aponeuroſis* of the *Biceps* Muſcle.

G A Branch ſent up from the radial Artery behind the external Condyle of the *Os humeri*, to anaſtomoſe with ſuch a Branch of the *humeral* Artery as E is.

The ſame Parts are pointed out in the three following Figures, by the Letters and Cyphers employed in the firſt Figure, which makes a Repetition of their Explication needleſs.

Fig. 2. is borrowed from Mr. *Cowper*'s Scheme of Arteries (*a*).

α Is a Branch ſent off from the *humeral* Artery, to anaſtomoſe behind the internal Condyle of the *Humerus*, with the Artery β, which comes from the Trunk of the *ulnar* and *median* Arteries.

H The *ulnar* Artery.

I The *median* Artery.

k Branches given to the Muſcles of the Hand from the humeral Artery, juſt as it is about to ſplit into its Branches.

Fig.

(*a*) Appendix to the Anatomy of human Bodies, Tab. III.

Fig. 3. Shews the *humeral* Artery dividing into two great Branches as it is coming out from the Arm-pit. These Branches are represented as if they lay at each others Sides, which the Oblique View I gave of them to the Painter obliged him to; but the one γ, which afterwards becomes the *radial*, is placed directly anterior to the other in the Subject, the *ulnar* δ lying pretty close to the Bone.

Fig. 4. Represents the *humeral* Artery splitting near the Middle of the Arm, ε being the larger anterior more superficial Branch, which goes on to divide as the *humeral* Artery in *Fig.* 1. does, while the lesser Branch ζ runs close on the Bone to open into the common Trunk of the *ulnar* and *median* Arteries.

H The *ulnar* Artery.

I The *median* Artery.

L The Branch marked β in the second Figure.

Not. The Muscles 6, 9, 10. are here cut through, and hang over the Cubit, while those marked 7, are drawn outwards, that the Arteries might be distinctly seen.

I ſtill preſerve the Arms repreſented by *Fig.* 1, 3, 4.

By the Diſtribution of the *humeral* Artery in *Fig.* 1. it would appear that the Artery which is in hazard of being hurt by the Lancet in Blood-letting of the Arm, is for ordinary the Trunk of the *humeral* Artery, and that the Lancet muſt pierce the tendinous *Aponeuroſis* of the *biceps* Muſcle before it touches the Artery. To be ſtill more aſſured of this, I puſhed Pins into the Arms of ſeveral Bodies at the ordinary Place where the *Baſilick* Vein is opened, and where the Cicatrices of former Venæſections were ſeen; and allowing the Pins to remain there, I diſſected the Parts till I ſaw what has been above aſſerted to be true.

Sometimes when the *median* Vein is opened lower than ordinary, the *radial* Artery may be hurt; but then its Wound muſt be ſo near its Riſe from the Trunk, that it is impoſſible to make any Ligature on the *radial* Artery above the Aperture; and therefore, ſeeing the humeral Artery muſt be tied, if the Operation of the *Aneuriſm* is performed, the Conſequences will be the ſame as if the humeral Artery had been wounded.

In

In all Patients then whoſe Veſſels are diſtributed in the common Way, without any conſiderable *Anaſtomoſis* between the *humeral* Artery and its large Branches in the Fore-Arm, it is in vain to expect that any Pulſe ſhould be felt at the Wriſt, after the Operation of the *Aneuriſm* is performed; and at the ſame Time, the Want of a Pulſe there, needs not make the Surgeon go on precipitately to the Amputation of the Member, becauſe the numerous ſmall Anaſtomoſes may be ſufficient to keep Life in it, and may poſſibly be gradually enlarged ſo much, as to reſtore Vigour and Strength to it.

When the Operation of the *Aneuriſm* is performed at the Bending of the Elbow to one who has the *Anaſtomoſis* repreſented in *Fig.* 2, the *humeral* Artery muſt be tied, but the Pulſe at the interior Side of the Wriſt will continue, and probably that on the exterior Side will ſoon be reſtored, becauſe the Blood may have the ſhort retrograde Motion from the Inſertion of the anaſtomiſing Tube into the *ulnar* Artery, to the Place where the *radial* Artery begins, without any great Diminution of its *Momentum*.

Thoſe who happen to have ſuch a Diviſion of the *humeral* Artery as is repreſent-

ed

ed in *Fig.* 3. can only have the *radial* Artery hurt in Venæſection, and after the Operation of the *Aneuriſm* will have a ſtronger Pulſe than formerly in the interior Side of the Wriſt, but will probably want it in the exterior Side.

If the Veſſels anaſtomoſe as in *Fig.* 4. you'll readily ſee, that the anterior Branch only being hurt, the Operation of the *Aneuriſm* may be performed without interrupting intirely the Courſe of the Blood either in the *radial* or *ulnar* Artery; and therefore the Pulſe may ſtill be felt in the common Place on both Sides of the Wriſt.

I have very little to add, by way of Remarks on the Hiſtory related by Mr. *Macgill*, having in the Account already given of the Formation of *Aneuriſms*, prevented any Explication of the principal *Phænomena*. I may however obſerve, that in that Hiſtory we can trace the gradual Formation of the *Polypus*, and from the Mixture of the deeper-coloured Parts of the Blood then ſqueezed out, with ſome of the diſſolved cellular Membrane, may underſtand how a Liquor like to Coffee made of half-burnt Beans could be collected within this *Aneuriſm*.

If the common Notion of the *true Aneuriſm* being a *Sac* formed by the dilated muſcular

ſcular Coat of Arteries, has not had its Riſe from Theory only, I would ſuſpect that the firſt Aſſerters of it, ſeeing the *Pleura* covering an *Aneuriſm* in the *Thorax*, or the tendinous *Aponeuroſis* of the *Biceps* here in the Arm adhering firmly to ſuch a Tumor, miſtook them for the muſcular Coat of the Artery. I have an Argument for this Suſpicion which ſeems very ſtrong to me, whatever it may do to others who are leſs liable to miſtake one Thing for another; it is this, that notwithſtanding my Theory and Diſſections had brought me to think true *Aneuriſms* to be at leaſt a very uncommon Diſeaſe, yet when I ſaw Mr. *Macgill* lay the tendinous *Aponeuroſis* bare, I was ready to have renounced my Opinion, being perſwaded it was the muſcular Coat of the Artery, till he moſt dexterouſly proſecuted the *Aponeuroſis* to its Riſe from the *Biceps*, and ſo fully convinced me of the Miſtake, into which I ſhould moſt readily have been led without diſcovering it, if the Operation had been performed in the more ſpeedy Way of laying the whole Tumor open by one Inciſion.

XVIII. *Hiſto-*

Vol. II. Tab. II

Fig. 1

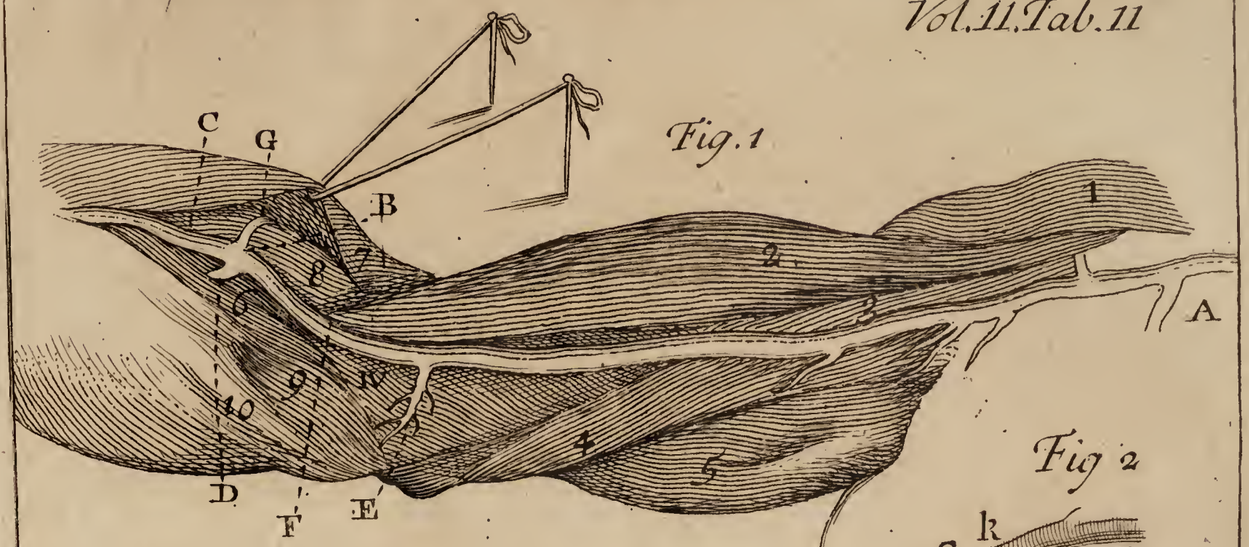


Fig 2

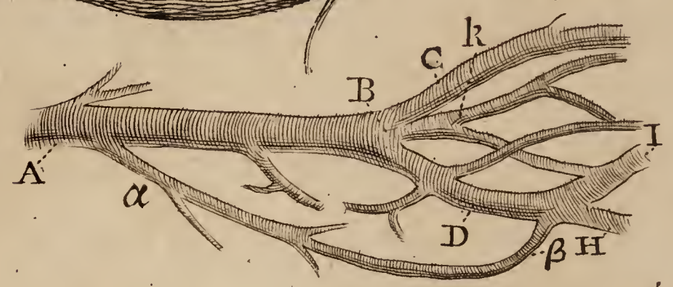


Fig 3

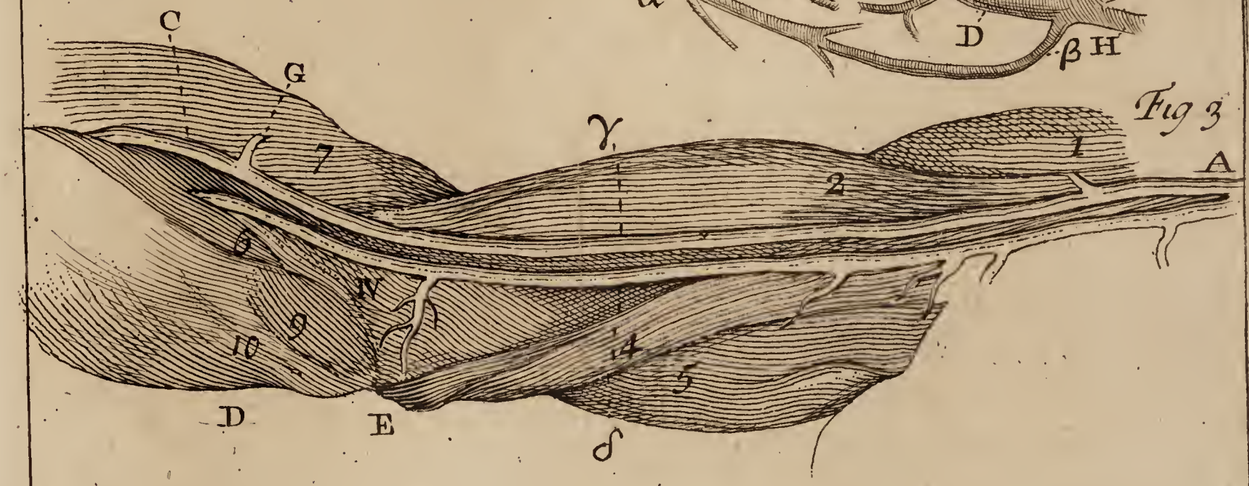
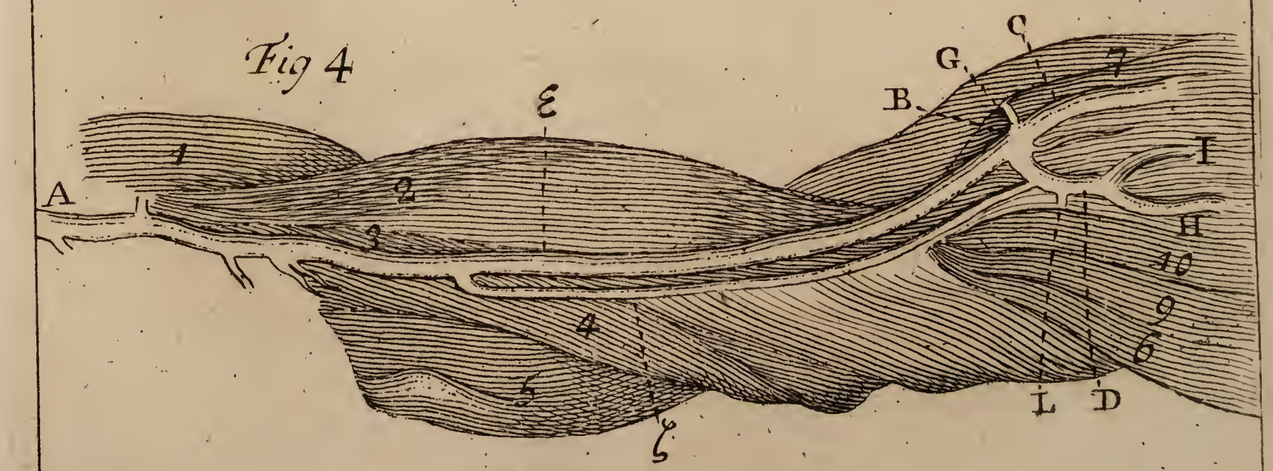


Fig 4



ad vivum del. & sculp: R: Cooper

XVIII. *Hiſtories of a Fever and of an Epilepſy; by* ANDREW ST. CLAIR M.D. *and Profeſſor of Medicine in the Univerſity of* Edinburgh.

AMONG the various Difficulties which attend the Practice of Phyſick, a conſiderable one ariſes from the Reſemblance of Symptoms in Diſeaſes of a different Nature. Hence it is that young Practitioners are commonly at a Loſs what Method of Cure to follow, where the Appearances don't fully diſcover the Nature of the Diſtemper: For however carefully a young Phyſician, during the Courſe of his Studies, be warned not to expect that he ſhall find Diſeaſes as diſtinct in Fact, as the Rules of Teaching require them to be explained, yet it is very natural for him at his firſt ſetting out in Practice, to judge of the Nature of the Diſeaſe by its firſt Appearances, and to ſettle the Method of Cure accordingly. It may therefore perhaps be of ſome Uſe to ſuch, for whoſe Benefit Hiſtories of particular Caſes are chiefly intended, to communicate, as Occaſion offers,

offers, Inſtances of ſuch Caſes as in the Iſſue were found to be different from what they appeared at firſt.

With this View I ſend you the two following Accounts, one of a *Fever*, the other of an *Epilepſy*, not indeed remarkable for any thing new or wonderful, far leſs for the Succeſs which attended them. As they both proved fatal, I need not tell you, that neither Vanity nor Intereſt are the Motives which determined me to make them publick; and I willingly leave it to proper Judges to decide, whether any thing has been omitted or miſapplied in the Cure of either. If they contribute in any meaſure to prevent too haſty a Determination of the Nature of Diſeaſes, and to engage young Practitioners to attend more to their Symptoms than their Name, in applying Remedies, I ſhall have my Wiſh.

A Boy, ten Years old, of a ſlender Habit of Body and delicate Conſtitution, was ſeized, about ſeven Years ago, with the Small-pox of the confluent Kind, and reduced to the greateſt Extremity. During his Sickneſs he was under the Care of a Phyſician of this Place, eminent for his extenſive and ſucceſsful Practice; and at length was reſtored to Health again, tho' with the Loſs of his left Eye, and Weakneſs

neſs of the right, which ever after was ſubject to Inflammations from the ſmalleſt Accidents. He was afterwards attacked ſometimes with a Looſeneſs, attended with feveriſh Fits and Vomitings, which yielded to gentle Vomits and Purges of *Rhubarb*. He had recovered the laſt of theſe about four Days, when on the 13th of *October* 1732 he was taken with Wearineſs, Coldneſs and Shiverings, which were ſoon ſucceeded with burning dry Heat, and then with Sweating.

October 14. Next Day he was free of all Complaints, except unuſual Wearineſs and want of Appetite.

15. The Day following, being called to him for the firſt Time, I found him very feveriſh, and was told the cold Fit had returned three Hours ſooner than on the 13th; he was free of Headach and Vomiting, his Eye was ſlightly inflamed, his Tongue whitiſh, his Breathing ſomewhat oppreſſed with frequent Sighs, his Stools of a natural Conſiſtence, and his Urine of a Straw-colour with a white Sediment. In the Evening, after bathing his Legs, he had a Sweat, and a reſtleſs Night; his Urine then was thick, with a Sediment as before.

16. He got a Vomit in the Morning, of the Infuſion of *Ipecacuan*, *Scrup*. ii. which

operated only once, Part having been loſt in preſſing him to drink it. Through the Day he made no Water, was coſtive, drowſy, and inclined to rave, his Pulſe ſoft, weak and ſcarce frequent. In the Evening he got a Turpentine Clyſter, which procured him a plentiful Stool, and a large Diſcharge of Urine, with a lateritious Sediment. He was reſtleſs till four next Morning, then ſlept ſound.

17. He continued to ſleep all next Day, almoſt without Interruption till Evening, had frequent Grindings with his Teeth, no cold Fit, nor any thing like a new Paroxyſm; his Pulſe grew gradually more frequent through the Day, but continued ſoft, full and weak. His Back was bliſtered in the Evening, he drank Emulſion, and had a reſtleſs Night.

18. Next Morning he was little ſenſible, but reſtleſs, his Pulſe ſmall and frequent, his Breathing free, his Tongue dry, his Urine thick, high-coloured, with a large brown Sediment. The *Cataplaſmata Craton.* were applied to his Soles, and a Spoonful of the *Decoct. Serpentar. comp.* was given every two Hours. At Noon the *Stupor* was leſs, his Pulſe ſometimes ſtronger, but variable; afterwards the Reſtleſneſs and Ravings increaſed till ſix of the Evening, when

when he fell into a ſound Sleep. He had paſt no Urine for eighteen Hours, till now that he got a Milk-Clyſter, and urined plentifully, but had no Stool.

19. He toſſed all Night, had a great Sweat on his Head, and frequently grinded his Teeth. In the Morning his Pulſe was weak and quick, the *Stupor* much increaſed, and his Countenance ghaſtly; Bliſters were immediately applied to his Arms and Ancles, Emulſion was given for his ordinary Drink, and a Spoonful of the following Mixture every two Hours.

℞ *Decoct. Serpentar. comp. ſine Mecon. Unc.* iv. *Sp. Salin. Aromat. Scrup.* ii. *M.*

Through the Day his Pulſe continued variable, ſometimes weaker, ſometimes ſtronger; the *Stupor* commonly abated upon taking the Mixture, but ſoon increaſed again; his Head and Palms only ſweated plentifully. In the Evening he paſt Water inſenſibly, and could ſwallow nothing but Liquids. The Cataplaſms at his Soles were renewed; he was more reſtleſs in the Night than before, ſhriek'd often, made Water inſenſibly, and the Sweating of his Head increaſed.

20. Towards Morning he got ſome Reſt, and then the *Stupor* was much abated, his

Judgment leſs diſturbed, his Tongue dry, of a deep red Colour, but not furred, his Pulſe ſomewhat ſtronger; a large Diſcharge followed upon removing the Bliſters, and the ſweating of his Head was almoſt gone. Thus he continued till Evening, that his Pulſe grew quicker and weaker, his Tongue moiſt; he became reſtleſs, paſs'd Water inſenſibly, raved, ſhriek'd and toſs'd till two in the Morning, then grew calm: At Night his Head was ordered to be bliſtered, but he was not able to bear ſhaving it. The Cataplaſms were renewed at his Soles.

21. After a ſoft Sleep all the former Symptoms returned with more Violence, while his Pulſe grew weaker; Bliſters were applied in the Morning to his Thighs; the Emulſion and *Decoct. Serpentar.* continued as before. No Change happened through the Day. In the Evening he got a Clyſter, which he could not retain, and late at Night was almoſt choaked with tough Defluxion in his Throat, which was brought up by the following Mixture.

℞ *Gumm. Ammon. Drach. ſem. Solvatur in Aq. Still. Hyſſop. Unc.* ii. *Acet. Scillit. Drach.* i. *M.*

Of this he took thrice at an Hour's Diſtance, till he got free of the Defluxion.

22. Next Morning his Pulſe was weaker and

and more frequent, a great Sweat on his Head and Hands, with a gentle Moiſture over his Body, no Defluxion in his Throat; the reſt as Yeſterday. He got the following Powder in a Spoonful of Sack-whey at Noon, and had it repeated in the Evening; the Sweat however on his Body did not increaſe through the Day, and ſtop'd altogether at Night.

℞ *Rad. Serpentar. virg. Gr.* vii. *Caſtor. Ruſſ. Gr.* iii. *Camphor. pur. Gr.* i. *M. f. Pulvis pro Doſe.*

As ſoon as the Sweat ſtopped, his Pulſe became ſo weak and quick as ſcarce to be reckoned; he had frequent deep Sighs, though his Breathing was otherwiſe eaſy. About Midnight the Defluxion returned to his Throat, and at Three of the Morning he died.

His Food, while he could take any thing ſolid, was chiefly Bread-berry, ſtoved Barley, and Bread ſoaked in Tea, or weak Sack-whey. His Drink (beſides Emulſion) was Barley-water, Tea, and weak Sack-whey, by Turns.

A Child about four Years old, well made, nimble, and of a beautiful florid Complexion, towards the Beginning of laſt Winter was taken with an obſtinate Cough,

Night-ſweats, Waſte of Fleſh, and other bad Symptoms, which threatned a Decay; but by due and timely Uſe of gentle Vomits, Balſamicks, Aſſes Milk, and Country Air, he ſeemed to recover perfect Health, notwithſtanding an unfavourable Seaſon: For his Appetite became good, his Digeſtion eaſy, no unnatural Thirſt or Heat, no Cough, his Breathing free, his Sleep ſound and calm, no Night-ſweats; nor was he ſoon fatigued at Play, but grew ſtrong, and recruited Fleſh daily, till he recovered his uſual Habit of Body.

On the 25th of *January* 1733 he complained of a Pain at his Stomach, and Itching at his Noſe; he was reſtleſs in the Night, and his Sleep frequently interrupted by ſudden Startings. Mr. *Macgill*, who had been ſo ſucceſsful in relieving his former Complaints, gave him three Grains of *Mercur. dulc.* (the Boy being ſhy to take unpleaſant Medicines) which procured him a looſe Stool or two, without any thing uncommon.

January 26. The Symptoms continued the ſame, together with a Diſpoſition to rave. He got a Clyſter that Day, which moved his Belly once.

27. He was brought to Town from the Country in the Neighbourhood. At three

After-

Afternoon I was called to him, and found him raving without Interruption ſcratching his Noſe, ſhrieking frequently; and was told, that when he ſlept, he wak'd ſuddenly with Startings, and cried out as if frightned. His Pulſe was full ſtrong and quite calm. He was immediately blooded at the Arm, and afterward got the following Powder, which was repeated at Night, and early next Morning.

℞ *Æthiop. miner. gr.* v. *Ent. Vener. gr.* ii. *M. f. pulvis pro doſe. Fiant hujuſmodi doſes* iii.

In the Evening he got a Clyſter, and had one Stool by it. He raved inceſſantly all Night, except in the Time of ſhort Sleeps, which were diſturbed as before with Startings and Shrieks. He ſcratched his Noſe almoſt without Interruption, ſleeping and waking.

28. In the Morning he knew no Body, his Pulſe was quite calm, ſoft, and ſufficiently ſtrong. The former Doſe of *Merc. dulc.* was repeated, and half an Ounce of *Tinct.* of *Rhubarb*, drunk above it. About Noon he was ſeized with an Epileptick Fit, which laſted ten Minutes, and was ſucceeded by a ſecond about an Hour after. A Bliſter was immediately applied betwixt his Shoulders; he got Emulſion to drink,

and a ſpoonful of the following Mixture at the Approach of a Fit, or when it went off.

℞ *Aq. Still. Flor. Chamæm. Vnc.* ii *Rut. Vnc.* i. *Tinctur. Caſtor. Drach. ſem. Sp. C. C. gutt.* xv. *Syrup. Caryoph. Vnc.* i. *M.*

In the Evening having had no Stool all Day, he got a purgative Clyſter, which moved his Belly once. He paſt this Night as the former.

29. About ſix in the Morning he had another Fit, which laſted longer than either of the former. The other Symptoms as Yeſterday. The *Mercur. dulc.* with *Tincture* of *Rhubarb* was repeated, but no Stool following, the purging Clyſter was given about one Afternoon, which was returned with very little Mixture of *Fæces*, and immediately after, ſharp Cataplaſms were applied to his Soles. In the Afternoon he became quite ſenſible, and continued ſo about two Hours. Towards Evening the Ravings returned; his Pulſe continued ſoft and calm; Bliſters were applied to his Ancles, and he got the following Draught.

℞ *Tinct. Rhei. ſimpl. Vnc. ſem. Syrup. de Rhamn. Drach.* ii. *M.*

30. At four of the Morning he had another Fit ſtill more ſevere, then a looſe Stool, and ſlept after. His Pulſe at nine was full

but

but languid and ſlower than that of a Man in Health. The laſt Purgative was repeated without any Effect. At Noon he ſeemed to be dying, but towards Evening his Pulſe and Looks grew better. A Bliſter was ordered for his Head, but not applied; the Purgative was then renewed. In the Night the Fits returned, and continued with little Intermiſſion. He had no Stool.

31. Next Morning the Fits continued, he got the following Mixture.

℞ *Syrup de Rhamn. cath. Drach.* ii. *Tinct. Jalapp. gutt.* xv. *M.*

This procured him a looſe Stool after Noon. In the Evening the Fits ſtill continuing, his Neck and Body were much diſtorted; he had no Pulſe, and died next Morning at ſeven.

During his Sickneſs he took ſometimes a little light Spoon-meat, and drank Emulſion, Tea, and Barley Water.

Upon opening the Body next Day, we found the Bowels of the lower Belly all ſound; the Stomach was almoſt empty, and though Mr. *Macgill* carefully ſlit open the Guts from one End to the other, there was not the leaſt Appearance of Worms to be found, nor indeed of any thing elſe, except about two Ounces of a glairy Subſtance, of the Conſiſtence of Jelly, near

the

the Beginning of the *Jejunum*, and a ſmall Quantity of ſoft *Fæces*, towards the lower End of the *Colon*; the Bile was ſomewhat thicker than natural, and of a dusky Colour. In the Breaſt nothing was faulty, but the Lungs, which adhered firmly on all Sides to the *Pleura*, and were full of Tubercles and ſuppurated Impoſthumes of different Sizes; ſo that wherever they were cut, either thin *Pus* ran out, or a thick Subſtance of the Conſiſtence of new Cheeſe was found within the Membranes of the Tubercles. The Blood-veſſels of the Brain were all greatly diſtended with Blood, and in the Ventricles about ſix Ounces of Water were found: The Brain itſelf appeared quite ſound.

Before I put an End to this Paper, allow me to obſerve, That tho' the firſt Caſe had almoſt all the Appearances of an Ague the firſt four Days, yet it proved a very different Diſeaſe, and required very different Management afterwards. In its Progreſs ſeveral of the Symptoms gave Ground to ſuſpect Worms in the lower Belly, though none were voided, and there was no Opportunity of examining the dead Body; but the Violence of the Fever itſelf, and of the other Symptoms ariſing from it, was ſo great

great, and of ſuch Conſequence, as to leave no Place for *Anthelmintick* Medicines. And here it deſerves to be obſerved, That in almoſt all ſymptomatick Fevers, where the Symptoms are ſtrong, and threaten immediate Danger, Regard muſt be had to theſe in the firſt Place, till their Violence abate, and allow Time and Opportunity to remove the particular Cauſe by proper Medicines. But on the contrary, where the Symptoms are not violent nor dangerous, the original Cauſe ought to be firſt carried off, and then commonly the ſymptomatick Fever ceaſes, either of it ſelf, or with very little Aſſiſtance.

'Tis remarkable in the ſecond Caſe, that for ſome time before the Child's laſt ſickning, he had all the Appearances of confirmed Health, although a ſure and certain Cauſe of a *Phthiſis Pulmonalis* was lodged in his Lungs; which undoubtedly would have proved fatal the Spring following: For neither the Tubercles nor Impoſthumes could poſſibly have been formed during his laſt Illneſs, which ſcarce allowed Time for ſuch a Progreſs, and ſhewed not any one Symptom of either. Hence it appears how little ſecure the Event of phthiſical Caſes is, even after all Complaints ceaſe, till the Patient has gone through all the different

Changes

Changes of the Seaſons, particularly Spring and Autumn.

Further, all the Symptoms of the Child's laſt Sickneſs ſeemed to point at Worms as the Cauſe of the Diſeaſe, inſomuch, that nothing was wanting to put the Matter beyond Doubt, except voiding them; which however never happened, nor were there any found upon opening the Body. A Diſappointment of this kind is no new Thing; for all experienced Phyſicians know, that every Symptom commonly produced by Worms (except that of voiding them) ſometimes ariſes from other Cauſes. It is therefore of Importance to obſerve, that the Method of Cure in theſe Caſes ought never to be confined to the *Vermifuga* alone; theſe indeed are not to be omitted where the Circumſtances will admit of them, as in the preſent Caſe; but at the ſame time the chief Symptoms are to be treated as if they were independent of any ſuch Cauſe.

XIX. *Anomalous Appearances after an Ague; by* Alexr. Monro, *Professor of Anatomy in the University of* Edinburgh, *and* F. R. S.

BY your allowing the Case I formerly extracted from the Records of the *Infirmary* here, a Place in your first Volume of *Medical Tracts*, I have Reason to think other Examples of Hospital Practice, if tolerably well chosen, will not be disagreeable to you. I have pick'd out the following History, because of its being so near of kin to the one I sent you last Year, both being the Effects of an ill-managed Ague, with some anomalous Appearances common to them; but at last the Symptoms come out very different: And the Manner of their being carried off is singular in each, and uncommon in both.

Isabel Durie, of a low labouring Station of Life, was always irregular in her menstrual Evacuations, being sometimes obstructed for a whole Year together; and was frequently attacked with a vomiting of Blood, for which she had used a great Vari-

Variety of Medicines; but never was relieved till 1727, which was the thirty ſeventh Year of her Age, when ſhe took ſome Purgatives, and had the bloody Vomitings only twice ever ſince. In *November* 1728, after a regular Courſe of the *Menſes*, ſhe was ſeized with a *Quotidian Ague*, which continued all the Winter, and waſted her Fleſh and Strength greatly. Towards the Spring the Paroxyſms became very irregular, both in their Time and Type; ſhe had a conſtant *Nauſea* and want of Appetite, with Pains through all her Body. From the firſt Attack of the Ague her *Menſtrua* ceaſed to flow; nor had ſhe any Appearance of them ever ſince that Time.

In the Summer of 1729, ſhe uſed many common Cures for her Ague, ſuch as Vinegar, the Roots of the *Bellis minor*, *Cortex Peruvian.* &c. with which ſhe put it off for ſome little Time; but always ſoon had irregular Returns.

In *March* 1730, inſtead of ſuffering the common cold and hot Fits, ſhe was ſeized with a violent trembling, or rather ſhaking of her Arms, or of her Head, or of her Legs, or of all together; which obſerved no certain Period of Time, either in their continuing or Intermiſſion, but attacked her three

three or four times one Day, then took the Form of *Quotidian*, and afterwards intermitted ſeveral Days, and ſoon again appeared in ſome of its former Shapes.

On account of theſe anomalous Shakings and flying Pains in her Head, Neck, Breaſt and Belly, ſhe was admitted into the *Infirmary* on the 15th *Auguſt* 1730. Her Pulſe was then little altered from the ordinary healthy State, even in the Time of the Tremblings, which however were ſo violent, that a ſtrong Man could not hold one of her Hands from ſhaking. Her Appetite and Digeſtion ſeemed to be good. Her Belly did its Office ſufficiently. Her Urine was in large enough Quantity, and of a good Colour, without any lateritious Sediment. There were no preternatural Swellings to be obſerved any where in the Patient's Body.

When ſhe was firſt taken in, her Diſeaſe ſeemed to yield conſiderably, and at laſt to be almoſt cured by the Uſe of *Muſtard Vomits* (*a*), repeated every three or four Days,

(*a*) This being a little out of the common Road of Practice, would be the better to be a little explained. The Powder of Muſtard Seed is made into the Conſiſtence of a Loch, with warm Water, in which a little Sea Salt has been diſſolved. Of this a common Spoonful, ſometimes two, diluted in tepid Water, are given with an empty Stomach; and it operates well as an Emetick,

Days, and by taking two *Drachms* of *crude Sal Ammoniac* every Morning. But in the Beginning of *September* the Pain of her Stomach returned, and the irregular Shakings soon succeeded; and did not yield to the former Medicines. She was therefore ordered frequent and large Doses of the *Stinking Gums*, *Galbanum* and *Asa fœtida*, with *Sal. C. C.* and an aloetic Purgative was now and then given her: These at first relieved her, but soon lost their Effect, all the Symptoms returning with their former Violence. Her Vomits and Salt were again tried; which failing, she took the hotter *Alexipharmicks*, and these were succeeded by the strengthning Stomachicks: But though she acknowledged herself relieved always for a Day or two, on the Change of the Medicines, she was soon as bad as ever.

The Physicians and Surgeons being so often disappointed, and her Case appearing to prove a very tedious, if not incurable Disease, while Recommendations were presented for several other diseased People, who needed immediate Assistance, she was dismissed on the 8th *October*.

She lived at *Leith* after this, where she had

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tick, and proves an excellent Remedy in most of the nervous Disorders. I have seen its good Effects in the Infirmary, and among my private Patients since I was taught it there.

had no Aſſiſtance, but ſometimes came to Town here to ask my Advice; by which I became acquainted with the Sequel of her Hiſtory. Her Tremblings and Pains continued in the ſame way notwithſtanding ſome nervous Medicines I gave her, till the Middle of *December*, when her right Arm ſwelled conſiderably at the Joint of the Elbow, with very racking Pain, and her Tremblings left her. By my Advice emollient Pultices of Bread and Milk, with ſome *Althea* Ointment, were applied; they relieved her ſomewhat of the Pain, but the Swelling of the Joint increaſed, and a ſlow Suppuration at laſt came on in *April* following. When the Abſceſs was opened, a little below the *Olecranon*, a conſiderable Quantity of watery *Pus* was evacuated, and ſhe had ſome Dreſſings delivered her; but having no skilful Hand to apply them, and not being in Condition to come frequently to Town, her Sore degenerated into two fiſtulous Ulcers, which continue ſtill to diſcharge a ſmall Quantity of a thin *Ichor*: Her Fore-arm is bended and rigid, with little or no Motion in the Elbow. But ſhe has been all this Time free from the bloody Vomitings, flying Pains, Tremblings, and all other Complaints, except the Trouble of her Arm.

This Woman's Diſeaſe went off in but a very indifferent Manner, ſhe having loſt almoſt the whole Uſe of one Arm; yet it is the moſt favourable Caſe of that kind, that I have either ſeen or heard of among my Acquaintances; for no other, of ſeveral whom I could name, under thoſe irregular Shakings, after an ill-managed Ague, have at all recovered. I ſaw one who has ſuffered a tedious continued Fever, with the Advantage of only a few Weeks Remiſſion from ſhaking.

XX. *Uncommon* Hæmorrhagies *for twenty nine Years; by Mr.* PATRICK MURRAY *Surgeon at* Earlſton.

ISABEL ROBERTSON, living in the Village of *Earlſton*, now aged forty four Years, after having had her *Menſtrua* twice at fifteen Years of Age, was thrown violently on a Stone, while the third Courſe of that natural Evacuation was on her; her left Shoulder was much hurt by the Fall, and ſhe ſoon vomited a great deal of Blood. Her *Menſtrua* left her before next Morn-

Morning, and ſhe had violent Pain in the left Shoulder and Side, with great Faintneſs and Sickneſs, vomiting Blood, and voiding it at the Noſe every now and then; which ſhe continued to do every Day to the Quantity of about half a Pound for two Years thereafter, the *Hæmorrhagy* obſerving no particular Time or Period, but returning four, five, ſix or ſeven Times in a Day: And ſometimes the Blood came not only by the Noſe and Mouth, but alſo by the Ears; and ſome Appearance of *Menſtrua* returned every fourth Night. During the four ſucceeding Years ſhe bled at Mouth, Noſe, Ears, Eyes and *Uterus*, having but ſhort Intermiſſions; only that by the *Uterus* was ſometimes ſtopped for ſeven or eleven Weeks, which ſhe attributes to the aſtringent Medicines which ſhe got in great Quantity.

In the ſixth Year of her Diſeaſe, cupping Glaſſes were applied to her Back, and ſtopped the Bloodings for ſeven Weeks; but this occaſioned a moſt violent Pain in her Breaſt, which ſwelled ſo much, that it was obliged to be ſcarified a little below the *Cartilago Enſiformis*.

In the eighth Year ſhe was greatly troubled with a Suppreſſion of Urine for eight or ten Days, of which ſhe was at laſt relie-

ved, by applying two living Toads to her Kidneys; what ſhe then paſſed was rather like Blood than Urine.

In the twelfth Year her Bloodings were not ſo frequent, they returning ſometimes every fifteen or twenty Days, and at moſt twice a Week; in which Way it has continued theſe ſeventeen Years more, only that within theſe two Years paſt, ſhe not only bloods at Mouth, Noſe, Ears and Eyes, and paſſes it by Stool, but I have ſeen it coming out from her Breaſts, and from the Roots of the Nails of both Fingers and Toes.

This poor Woman has always lived on the loweſt vegetable Food, being born of mean Parents, and being ſuſtained theſe Years bygone by the Church-box; nor was ſhe ever ſenſible, that any little Change of Diet that ſhe has had, either made her Bloodings more or leſs frequent, or in greater or leſs Quantity. She is ſenſible of little or no Pain before the Bloodings come on, but knows their Approach, by a Stiffneſs in the Finger and Toe-points, and by her becoming duſl of Hearing. She is ſenſible when the Eaſt-wind blows, for then ſhe is chill and cold, and it brings on the *Hæmorrhagy*, eſpecially at the Noſe and Mouth. After each *Hæmorrhagy* ſhe is faint

faint and ſick for ſome Days. During the firſt twenty Years of her *Hæmorrhagies*, ſhe was able in their Intervals to walk through the Town; but, ſince that, ſhe is for moſt part confined to her Bed, and is very wan-coloured, feeble and weak, but has her Judgment and Memory ſtill intire.

In the firſt Years of her Illneſs, ſhe got a great Variety of Medicines, from none of which ſhe found any Change, unleſs that ſhe thought the *Tinctura Antiphthiſica* made her Blood thicker, though it did not prevent the *Hæmorrhagy*.

For ſeveral Years ſhe was let Blood of at either Arm or Ancle, and ſometimes at both, every eight or ten Days, and frequently oftner. Now ſhe is blooded every Fortnight or three Weeks. She could not obſerve that opening a Vein, when ſhe let to the Quantity of fourteen Ounces, immediately before ſhe expected the *Hæmorrhagy*, ever prevented it, or that *Venæſection* ever ſtopped it; but they make it more moderate, which has induced her to continue this twenty nine Years in the uſe of it.

All the Times that I have let Blood of her, it is no higher coloured, or of thicker Conſiſtence than Water, in which Fleſh has been waſhed; and what I have ſeen her e-

vacuate in the *Hæmorrhagies* is of the ſame Nature: And ſhe tells me it has not been thicker theſe many Years paſt.

Any of you, Gentlemen, who happen to come to this Part of the Country, may ſatisfy your ſelves of the Truth of what I have told, for ſhe is very fond of relating her Hiſtory; in the mean Time, allow me to appeal to Mr. *Monro* Profeſſor of Anatomy at *Edinburgh*, as a Voucher, whom you certainly know and will credit, who has ſeen her ſeveral Times, examined herſelf and Neighbours concerning her Caſe, and deſired me to draw up this Account.

XXI. *The* Dura Mater *oſſified, and other morbid Appearances obſerved; by Mr.* John Paisley *Surgeon in* Glaſgow.

IN a Man whom I diſſected, *February* 1732, I found the *Omentum* very much emaciated, conſiſting only of the Membranes and Veſſels.

The *Veſicula fellis* was enlarged as big as both my Fiſts; and from all the Trials I could make, the *Ductus cyſticus* ſeemed entirely collapſed; I could eaſily paſs a Probe

Probe from the *Duodenum*, through the *Ductus communis cholidochus*, but not into the *cyſtick* Duct; neither could I ſqueeze one Drop of the Bile from the *cyſtis* to the Gut. Theſe Trials confirmed me in the Opinion, that that Duct was grown together, and hindred me from trying it by Injection, which ought likewiſe to have been done, to put it paſt Diſpute. Upon opening the *Veſica*, I found that it contained a great Quantity of a dusky-colour'd Bile, with many ſmall black ſtony Concretions, tho' none of them were in the Duct; nor could I then diſtinguiſh the Place where the Duct made its Exit from the *Cyſtis*. The Liver was a little ſchirrhous, and of a conſiderable bigneſs.

The Spleen was likewiſe very large, and adhered ſo firmly to the Diaphragm, that it could not be ſeparated from it, without a conſiderable Force.

The Heart was very large and flaccid; the left Ventricle conſiderably larger than the Right, and its Sides at leaſt as thin; The Reaſon of which I could not ſo well underſtand or explain, unleſs it were owing to a ſmall Hole obſervable in two of the ſemilunar Valves in the Mouth of the *Aorta*, ſo big, as eaſily to allow a large Probe or ſmall Crow-Quill to

pass them, by which in the Contractions of the *Aorta*, when these Valves were thrust back, some of the Blood might regurgitate into the Ventricle. The upper *Limbus* of one of the Valves was cartilaginous; in another there was a small cartilaginous Substance about the Bigness of a *Coriander* Seed, not perfectly spherical, but a little angular.

After removing the *Cranium*, and cutting up the *Dura mater* upon each Side of the *Falx*, in order to take out the Brain, I found some hard Bodies in the *Falx*, which I thought at first were some stony Concretions; but upon Examination found they were Bones. On the right Side there were four of them, of the same Dimensions and Figures, as in the annexed *Tab.* III. *Fig.* 1. E E E E stretching out sharp pointed *Striæ* every Way, a small Part of the three anterior, which are the largest, being formed in the *Falx*, the rest of them in the *Dura mater* of that Side, D D D, which in the Figure appears folded up, to be in a Plain with the *Falx*. There was no Appearance of any of these Bones upon the external Side of the *Dura mater*.

A little farther forward in the *Falx*, near its anterior Part, was a large Bone, more than an Inch and a half in length, and a large

half

half Inch in breadth, very protuberant on the right Side, and angular at M, with ſharp-pointed *Striæ* all round, eſpecially at its anterior Part. This appeared likewiſe on the other Side of the *Falx*, but not half ſo large; the whole of that Membrane on the left Side not being oſſified, oppoſite to the Bone, but only the Part F, as in *Fig.* 2. It was not protuberant on this Side, but rather a little hollowed. On this left Side appeared another Bone K, diſtinct from theſe on the right, and lying in the ſame Manner in the *Falx* and *Dura mater*.

A little further forward, near the Attachment of the *Falx* to the *Criſta Galli*, is another ſmall Bone G, equally conſpicuous on both Sides.

Though I could not procure ſuch a diſtinct Account of this Man's Life and Malady as might be neceſſary to illuſtrate the foregoing Hiſtory, I have ſent it to you, Gentlemen, that if you think the communicating thereof to the World may be of any Uſe, you may do it; if you don't think it proper to give it a Place in your Collection, you may throw it aſide.

Scribere te nobis, tibi nos accredere par eſt. HOR.

All

All I have heard with respect to him, was, That he had been a Soldier, was many Years abroad, but has been in this Country again more than twenty Years, did not complain much of Headachs, was no great Drinker, neither was much indisposed, till about six Weeks before his Death, that he took a Fever, and after it a Jaundice, of which he died.

The Figures are drawn very exactly from the dried *Falx* (which I have still by me) by Mr. *William Robertson* Limner.

TAB. III. *Fig.* 1.

AAAA, The *Sinus longitudinalis superior.*

BBBB, The *Sinus longitudinalis inferior.*

C, The fourth *Sinus* of the *Dura mater.*

DDD, Part of the *Dura mater* of the right Side turned up, so as to be in a Plain with the *Falx*, that the four following Bones may be seen.

EEEE, Four small Bones, the three anterior being the largest.

F, The large Bone in the *Falx*, very protuberant and angular at M, being more than half an Inch thick at this Part.

G, An-

G, Another ſmall Bone equally conſpicuous on both Sides.

H, The ſecond Proceſs of the *Dura mater.*

L, The anterior Part of the *Falx*, where it takes its Riſe from the *Criſta galli.*

Fig. 2.

AAA, The *Sinus longitudinalis ſuperior.*

BBB, The *Sinus longitudinalis inferior.*

C, The fourth *Sinus* of the *Dura mater.*

DD, Part of the *Dura mater* of the left Side turned up, that the following Bone may be ſeen.

K, A ſmall Bone on the left Side.

F, The Appearance of the large Bone in the left Side of the *Falx.*

G, The ſmall Bone in the *Falx* equally viſible on both Sides.

H, The ſecond Proceſs of the *Dura mater.*

L, The anterior Point of the *Falx.*

XXII. *A Conſumption and Dropſy of the Breaſt, from a Wound too haſtily cloſed; by Dr.* GILBERT WAUGH *Phyſician at* Kirkleathem *in* Yorkſhire.

ARTHUR CAYLEY, a young Gentleman about fifteen Years of Age, was of a weakly Conſtitution, a bilious Temperament, and frequently ſubject to the Jaundice.

It happened unluckily, about three Months before his Death, as he was running to School, with a Penknife in his Hand, that he fell, and thereby received a Wound about an Inch below the Nipple of his right Breaſt; thence iſſued a ſmall Quantity of Blood before the Surgeon came, who judging the Wound altogether ſuperficial, did without Heſitation heal it up, though the Symptoms plainly indicated that the Hurt was deeper; for the Patient inceſſantly complained leſs or more of a Pain in his Breaſt, which was ſometimes ſo violent, that he could neither laugh nor cough without Torture; nor could he inſpire fully, without the greateſt Uneaſineſs; ſo that his Neighbours judged him

Fig. 1.

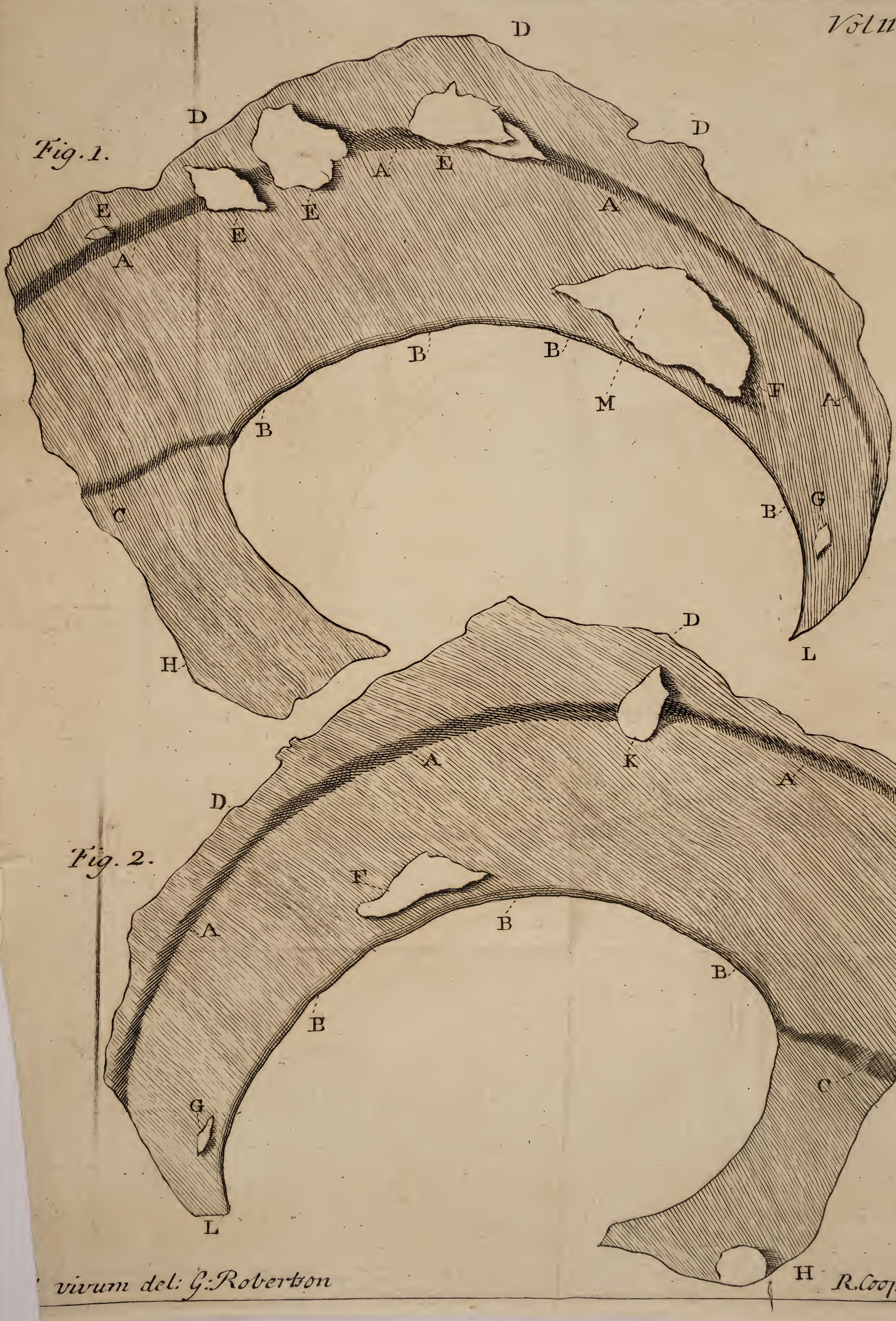


Fig. 2.

vivum del: G: Roberton

R. Cooper sculpt

him in a lingring Condition; and with Pity obſerved him going off by a gradual Conſumption, without a violent Cough or purulent Spitting. The Symptoms of his Diſeaſe were, perhaps, more gentle, that he naturally loved, and always uſed a Milk-Diet.

I was called only four Days before his Death; at which Time he complained conſtantly of an acute Pain in his left Side, about the Situation of the *Diaphragm*, and of an unſupportable Anxiety and Difficulty of breathing, an intenſe Heat within his Breaſt, an unquenchable Thirſt, and exceſſive Coldneſs of the extreme Parts; his Eyes were dim and cloudy, as in the laſt Struggles; his Urine variable, ſometimes letting fall a light ſlimy Sediment, but for the moſt part pale, with none; his Pulſe weak, ſlow, and ſometimes intermitting; He had a Tenſion of the *Hypochondria*, and Stomach, and cold Sweats about his Head and Breaſt; all which ſeemed to intimate Death inevitable. However, that I might in ſome meaſure anſwer the Importunity of my Patient's Mother, I was obliged to preſcribe, though with ſmall Hopes of Succeſs. The preſent Situation of Affairs abſolutely forbad Bleeding, and there was ſcarce any other Mean left, but to attempt

tempt to give him ſome ſmall Relief by a pectoral Decoction for Drink, the Inſpiration of the Fumes of the ſame made warm, and mixed with Vinegar and ſome other pectoral Medicines uſually preſcribed in ſuch Caſes. Veſicatory Plaiſters were likewiſe applied to the Extremities. In a few Hours his Cough (which before had given little Trouble) growing more frequent, flattered us with Hopes of a ſucceeding Expectoration; but they were found groundleſs: The Pain in his Side alſo apparently yielded to a Fomentation; but the other Symptoms not only remained, but increaſed, till Death put a Period to them all.

Having obtained Liberty to open the Body, I obſerved the Skin on the left Side appeared blotted, and diſcoloured in a very ſingular Manner. The Teguments of the Breaſt being laid aſide, the firſt Thing that ſtruck my Eye was the callous Veſtige of the Wound, clearly demonſtrating the Progreſs of the Knife into the Cavity of the *Thorax*. Having then raiſed the *Sternum*, I found that the *Pleura* on the right Side was much thicker than natural, and in ſome Places almoſt cartilaginous, ſtrictly adhering to the Ribs. I found alſo at the Veſtige of the Wound, a remarkable Coheſion of the Lungs to the *Pleura*. Having

ſepa-

ſeparated the right Lobe of the Lungs, there appeared at the Part adhering to the *Pleura*, a hard ſcirrhous Lump almoſt as big as a Walnut, under which I diſcovered a large Collection of *Pus*, which had alſo made its Way into the other Lobe of the Lungs.

In the left Side of the *Thorax* was contained Water to the Quantity of eight Pounds, in which did ſubſide a thick white Water, not unlike half-melted Suet.

Having removed the Water, I found the left Lobe of the Lungs not the Bigneſs of my Fiſt, and no way reſembling the Subſtance or Figure of Lungs, but a putrid Lump. The *Pleura* on this Side was quite waſted.

The *Heart*, with its Veſſels, was very ſmall, void of Blood, on all Sides firmly attached to the *Pericardium*.

The Colour of the *Liver* was good, but its Subſtance ſomewhat harder, and the Size larger than natural.

The *Gall-bladder* was turgid with Bile, whoſe Colour was not a laudable yellow, but much inclined to black.

XXIII. *An*

XXIII. *An* Aſthma *accompanied with Palpitation and flying Pains of the Breaſt and Shoulder; by Dr.* Robert Lowis, *Fellow of the College of Phyſicians at* Edinburgh.

A Healthy Boy, about four or five Years of Age, after playing among wet Graſs, was ſuddenly ſeized in the Night with a Suffocation; of which he was immediately relieved, by a plentiful Bloodletting at the Arm: But ever after was obſerved, when ſpeaking much, or at his Diverſions, not to have ſo free and long Breathing as uſual.

In *November* 1721, being then about eleven Years of Age, he was affected with a Pain of his right Shoulder and Breaſt, which gave him great Uneaſineſs in breathing; his Pulſe at firſt differed not much from what it uſed to be in Health, but in the Progreſs of his Diſeaſe became feeble, frequent and unequal. He had ſome Cough, but not very troubleſome; his Appetite for Food was little, and his Thirſt moderate: His Urine was generally in ſmall Quanti-

ty,

ty, of a reddiſh Colour; and when it did ſeparate, let fall a copious brown Ground. Towards the End of his Illneſs, he had a Pulſation at the Pit of his Stomach, but not ſo conſiderable as in the two following Returns of it. He had a Swelling of the Teſticles and *Scrotum*, and of his Legs, chiefly towards Evening; at which Time alſo his Pains were moſt violent, and often obliged him to ly upon his Elbows and Knees, in which Poſture he always found moſt Eaſe.

The Remedies uſed were repeated Blood-lettings, to the Amount of forty Ounces, in leſs than three Weeks, by each of which he was ſenſibly relieved, but the Pains always returned in three, four or five Days; all his Blood was ſizy: He took ſeveral Vomits and Purges, Infuſion of Stone-Horſe Dung, *Sperma Cetæ*, with volatile Salts, Expreſſion of Hog-Lice, and other Medicines, to the ſame Intention. He had alſo externally ſpirituous Liniments. And laſt of all, his Pains ſtill returning, he took forty or fifty Grains of *Sweet Mercury* in ſmall Doſes; which, without Salivation, Soreneſs of Mouth, or any conſiderable Evacuation, freed him of his Pains and other Symptoms, after ſix or ſeven Weeks Illneſs.

In *June* 1723 he had a ſecond Return; only in this the Symptoms were more uneaſy: Blood-lettings had no better Effect than before, and for that Reaſon were not ſo often repeated: Mercury given as formerly had not like Succeſs: Tepid Baths, with cupping and ſcarifying where the Pain was moſt afflicting, gave ſome Relief; the Pain and other Symptoms yielded gradually, and, the Seaſon of the Year favouring, by the Help of Aſſes Milk and moderate Exerciſe on Horſeback, after two Months Illneſs, he recovered.

The third and laſt Return was about the Beginning of *September* 1724: The Symptoms were ſtill worſe than in the former; Blood-letting three or four Times repeated gave but ſhort Relief, Mercury none at all; the Pulſation at the Pit of the Stomach became much more obſervable; there was a conſiderable Tenſion in the Region of the Stomach and right Hypochonder. About a Week before his Death, he complained of a ſlight dull Pain in theſe Parts, but had no Vomiting, nor Signs of greater Fever than before; his Legs ſwelled to a vaſt Bigneſs, his Face alſo ſwelled, but the reſt of his Body was much emaciated; his Breathing was very laborious, with a ſhort Cough, and little Expectoration. What he did ſpit

up

up with much Trouble, as he drew near his End, ſeemed to be a browniſh *Pus*, mixed with a little Blood. With theſe Symptoms his Pains continuing, made his former Poſture of lying upon Elbows and Knees afford him little Relief; the moſt he had was ſtanding with his Arms leaning upon the Back of a Chair, or ſitting with his Breaſt and Arms leaning forward upon Pillows laid on a Table. And in this Poſture he died *October* 18th.

Upon the 20th his Body was opened.

1. In the lower Belly the Stomach was found much diſtended, and upon the Bottom of it towards the left Side there was a Mortification about the Breadth of the Palm of a Man's Hand.

2. The Liver was very large, but otherwiſe ſound.

3. In the *Thorax*, the Lungs were attached to the *Pleura* in two or three Places, otherwiſe they were pretty ſound.

4. The whole Surface of the Heart was as cloſely united to the *Pericardium* as to its own proper Membrane, and each of its Ventricles was capable of containing a Gill of Liquor.

XXIV. *A Tumor in the* Oeſophagus, *hindring Deglutition almoſt intirely*; *by Dr.* FRANCIS PRINGLE, *late Preſident of the College of Phyſicians at* Edinburgh.

IN the Year 1712, a Gentleman of a robuſt healthy Conſtitution, and in the Flower of his Age, after hard drinking eſpecially of Spirits, was ſeized in the Month of *May*, with a throwing up of every thing he eat or drank, and that without Pain, violent Reachings to vomit, previous Sickneſs or *Nauſea*; but the Moment he ſwallowed Meat or Drink, almoſt before it entred the Stomach, it was returned again, as if he had ſpit it out of his Mouth only. This Symptom, however ſlight and inconſiderable it appeared at firſt in one of his Age and Strength, eluded the Force of a great Variety of Medicines; Vomits, Stomachick Purgatives, Bitters and Strengthners, *Chalybeates*, Mineral Waters, Aſſes Milk, teſtaceous Powders, *&c.* were all preſcribed in their Turns, to no Purpoſe. The Diſeaſe, ſtill continuing obſtinate, began ſoon to be attended with a daily and gradual

gradual Decay of Strength and Fleſh, and a conſtant Chillneſs, even during the Summer Seaſon; till at laſt he was brought into a perfect *Maraſmus* and *Atrophy*, in which Condition he died in *October* following, never having any other Symptom than thoſe mentioned.

His Body being opened, there was a hard glandular Excreſcence found in the Cavity of the *Oeſophagus*, continued from the middle of this Canal to the upper Orifice of the Stomach, filling the whole Cavity ſo much, that a Probe cou'd ſcarce be thruſt down to the Stomach.

XXV. *Difficulty of ſwallowing, Loſs of Appetite*, &c. *from ſchirrous Tumors in the* Oeſophagus *and Stomach; by Dr.* JOHN TAYLOR, *Fellow of the College of Phyſicians at* Edinburgh.

——— ——— Aged thirty four, of a ſlender Habit, but of a very healthy Conſtitution, complained, for almoſt a Year, of a Pain frequently attacking him under the *Xiphoid* Cartilage, without uſing any Medicine: After this, upon getting for ſome Time his Diet very irregularly, he loſt his Ap-

petite and Digeſtion; for which he was adviſed to try Steel, Ginger, and Pepper mixed. Having continued the Uſe of this Powder three or four Weeks without any Benefit; but, on the contrary, his Symptoms growing every way worſe, and his Body waſting conſiderably, he asked my Advice, about the End of *November* laſt. His Complaints then were a Decay of Fleſh, Strength and Colour, a great Difficulty for moſt part in ſwallowing any ſolid Food, which, after paſſing eaſily enough to near the Mouth of the Stomach, met there with great Reſiſtance, being ſenſibly compreſſed, and occaſioning much Pain before it got further down; and frequently the deſcending *Bolus* was violently ſqueezed back into the *Fauces* from this Part, while ſometimes, though ſeldom it could get without any Impediment into the Stomach; whence he commonly was ſoon obliged to ſpout up again his Victuals, with a great deal of Phlegm. He had however little or no Trouble in ſwallowing or retaining Liquids or thin Food, provided he ſwallowed them ſlowly. He alſo complained much of a conſtant girding acroſs the lower Part of the *Epigaſtrick* Region. He never had been ſenſible of his receiving any Hurt, neither was there any external Pain or Tumor felt;

his

his Pulſe was full and good; he ſlept well, had no Thirſt or Sweats; his Urine was in a natural enough Quantity, but crude; he was generally coſtive, and much troubled with Belching and *Borborygmi*.

I flattered my ſelf that his Symptoms were moſtly nervous; and therefore reſolved to cleanſe the *primæ viæ* firſt; and then to preſcribe him corroborant Medicines, with ſome of the milder Antihyſtericks.

Doſes of *Ipecacuan* in Subſtance and Infuſion, though larger than ordinary, and aſſiſted by *Carduus* Tea for Drink, had no Effect on him: But the *Tinctura ſacra* and *Rhubarb. compoſit.* anſwered very well as Purgatives; and he got Pills compoſed of the ſofter Gums, *Rhubarb* and *Extract. Fl. Chamæmeli*, in a few Spoonfuls of an Antihyſteric Julep; by the Uſe of which, with gentle bitter Stomachic Infuſions, an eaſy nouriſhing Diet, and proper Exerciſe, his Appetite and Digeſtion became better in a few Days; I added ſoon a little Soap to the Pills, and ſome compound Stomachic Waters to the Julep; and in ſome Time after, I mixed Steel with the former, and diſſolved a little *Aſa fœtida* in the latter, and applied the Antihyſterick Plaiſter to the Epigaſtric Region; by which Means he recovered his Appetite, Fleſh, Strength and

Colour, and his Girding became eaſier; but ſtill the Complaints in ſwallowing remained, as well as the ſpouting up his Food, with great Quantities of Phlegm: To remove this I gave him *Oxymel Scillitic.* and afterwards *Vini Emet. drach.* x. but could procure only ſome weak Attempts to vomit, which brought up nothing.

Towards the End of *December* he was violently ſeized with a *Nephritis* in both Kidneys, attended with a total Suppreſſion of Urine; which kept him five Days in a very miſerable Condition, notwithſtanding all the ordinary Evacuations, Bathings, Diureticks, *&c.* proper in that Diſeaſe, till at laſt he paſſed a Stone that had come down from the right Kidney: But this Shock left him much weaker, and made all the Complaints of his Appetite, Deglutition and Digeſtion worſe than ever, ſo that he could bear no ſolid Food, and his Medicines were all thrown back, except a medicated Ale, in which bitter Stomachic and diuretick Materials had been infuſed.

Upon my deſiring Aſſiſtance, Dr. *Francis Pringle*, late Preſident of our College was conſulted. We ordered ſome *Fl. Sulphuris* to be taken in Milk every Morning, and renewed the gummous Pills, with Soap and *Balſam. Peruvian*; which he continu-

tinued to uſe till the beginning of *February*, without any Relief; about which Time the Patient obſerved, that if he eat Bread with any Liquors, he was ſure to throw all up; which did not happen, if he firſt eat the Bread, and ſome while after drank the Liquors.

Next, we preſcribed Riding, *Æthiops Mineral*, and a Decoction of the *Pareira Brava*, with ſome *Tinctura Martis in Vino Rhenano*, which he took a conſiderable Time to no Purpoſe, his Symptoms turning worſe, his Body waſting apace, and his Pulſe becoming quicker.

About the Middle of *March* he began to have Morning Sweats, without any Cough or groſs Spitting; ſoon after which, as he was walking in the Fields, he brought up two *polypous*-like Subſtances, in the ſame Way as he uſed to do his Food; one of theſe was of a firmer Conſiſtence than the other, but was pretty much putrified at its Extremities. They both reſembled a *Piſtachio* Nut in Figure and Bulk, only they were about a third longer. Immediately upon their coming away, he felt a ſharp Pain in his Breaſt, which continued conſtant four Days, he taking in the mean time *Aq. Calcis* in Milk, and a mild healing Electuary. In a Fortnight after he brought up a third Subſtance, like the two former,

but

but without feeling any Pain at the time, or after; neither did he evacuate any thing bloody by the Mouth or by Stool at either Time. After the coming away of this third Body he had no more Night-Sweats.

We then forbore giving Medicines, and only recommended a Milk Diet, and moderate Exerciſe.

After the Middle of *April*, he found Veal, young Pigeons, and ſuch like, do much better with him than the thin Food which he could only bear formerly.

In the Beginning of *May* he underwent a gentle ſhort Fit of the *Nephritis* in the right Kidney, and then began to be ſenſible of a Hardneſs in the left *Hypochondre*, which he always complained of from that Time. Soon after this a *Diarrhœa*, with whitiſh-coloured Stools, came on; we could not ſtop it, and he decayed faſt: So that he died before the Middle of *June*, greatly emaciated, but perfectly diſtinct in his Senſes and Judgment.

His Body was opened at my Deſire, in Preſence of Mr. *Monro* Profeſſor of Anatomy, by Mr. *George Young* Surgeon Apothecary, who had attended him during all his Sickneſs.

Upon cutting the Teguments of the *Abdomen*, the lower Edge of the *Omentum*, which

which was very ſhort, was ſeen grown to the *Peritonæum* from one Side to the other of the lower Part of the *Epigaſtrick Region*. The *Omentum* was thin, but hard and firm, at the Place of this Attachment; which being cut, and the Teguments laid back, it was likewiſe ſeen adhering to the Inteſtines in ſeveral Parts, being every where ſcirrhous and vaſtly thick where it adhered to the Liver, Spleen and Stomach, the two former being firmly connected to the laſt by it. In cutting away the *Omentum* from the other Bowels, we diſcovered a great many little Abſceſſes in its Subſtance. The Surface of the Liver, Spleen and Stomach had ſmall white Tubercles ſcattered over them, excepting which, ſo much of the Stomach as was then in Sight, appeared natural enough, only its *Dorſum* adhered every where very firmly to the *Diaphragm*, by means of a hard ſteatomatous or ſcirrhous Subſtance like to that of the *Omentum*.

The Inteſtines ſeemed a little inflamed in ſome Places, and were grown more than uſual to the *Peritonæum*.

The Kidneys and *Veſica Urinaria* contained no Stone, contrary to what we expected.

All

All the other *Viſcera* of the *Abdomen* were ſound.

When the *Thorax* was laid open, we took ſome bloody Water out of each Cavity. The Lungs appeared ſound, only the inferior Lob of the left Side adhered firmly to the *Diaphragm*; where, when we were ſeparating it, we diſcovered an Abſceſs containing ſome *Pus* and a viſcous brown Fluid, exactly like to what was found in the Stomach afterwards. The Cavity in the Lungs was not larger than to receive two Ounces of Liquor; but from that the Abſceſs penetrated through the *Diaphragm* and Coats of the contiguous Stomach into its Cavity, the Perforation in the *Diaphragm* and Stomach being large enough to allow one's Thumb to paſs.

The *Oeſophagus* was ſound till within two Inches of the *Diaphragm*, where it degenerated into a white thick ſcirrhous Subſtance, in which there were a great many ſmall Suppurations, each of which opened into this Canal. The ſuperior Orifice and Subſtance of the Stomach, for ſome Inches below, were much in the ſame Condition; ſo that the *Par vagum* being here compreſſed, this Bowel might probably have been rendred ſo inſenſible, as not to be moved by

by the ſtrong Emeticks which had been given him.

The Glands at the Diviſions of the *Trachæa Arteria* were infarcted with a ſpongy ſtony Subſtance, incloſed in a very firm black Membrane.

All the other Parts were in a natural State.

XXVI. *An Account of an extraordinary Worm; by Mr.* JOHN PAISLEY *Surgeon in* Glaſgow.

IN *February* laſt a young Man was wounded in a Duel with a ſmall Sword, which entred about four Inches below the right Nipple, and a little towards the Back; by probing the Wound, we found it reached four Inches ſlanting downwards betwixt the Teguments and the Ribs, without any Signs of its penetrating, though all the different Ways to diſcover it were tried, as probing, Injection, *&c.* He told us he was in his utmoſt *Longe*, when he got the Wound, and ran upon his Antagoniſt's Sword, who having both a much longer Arm and Sword than he, and being taller,

taller, had dropped the Point of it a little, otherwiſe it was not poſſible to ſee how he could have got ſuch a Wound. He loſt a conſiderable Quantity of Blood, by which after he had walked off the Field for a conſiderable Way, he turned faintiſh; when he held his Hand upon the Wound, he could eaſily ſtop the Bleeding; but the Pain ſoon obliging him to take it off, the Blood guſhed out for a little briskly, then ran trickling down, as from any ſuch ſmall Wound in the Teguments. When he fainted, it was upon a Stair-caſe, early in the Morning, where he lay above an Hour, with nothing upon him but his Shirt and riding Coat. At firſt the Wound was dreſſed with dry Dreſſings, the Blood eaſily ſtopt; and by a gradual Compreſs, and the Scapulary and Napkin, it was bandaged up. In two or three Days, the Suppuration ſucceeding well, it healed up in eight or ten more.

The third Day at Night, after he had received the Wound, he complained of a violent Pain in the Region of the Stomach, and in the Back oppoſite to it; but none near any Part where the Wound was, and had ſome Reachings to vomit; upon which I was afraid leſt the Sword ſhould have ſlipt through below one of the Ribs, and pierced

pierced through the *Diaphragm*, and touched the Liver, though he had none of the other Signs of theſe Parts being wounded. He was confined to a low Diet from the Beginning, and having a great Cough before he was wounded, which no doubt was increaſed by his lying ſo long on a Cold Stair almoſt naked, he was ordered proper *Linctuſes*, *Apozems*, &c. by Dr. *Brisbane*, who was the Phyſician that attended him, and an Anodyne Draught at Bed-time. His Pulſe was a little quick the firſt three Days, but, on the fourth, the Pain in his Back was entirely gone, as was the Fever, and the Pain in the Stomach was much abated: He complained of no Drought, nor of any other Uneaſineſs, but of the Cough and the Pain in his Stomach, which recurred frequently in the Night-Time, and eſpecially towards the Morning. About the fourteenth Day from his receiving the Wound, he was attacked with ſome aguiſh Fits, and profuſe Sweatings, without any regular Appearance; ſo that it could not be reduced to any kind of intermitting Fever; and ſometimes was thrown into ſtrong convulſive Fits, tho' he ſaid he never had had any ſuch all his Life before.

About the 15th of *March* all terminated in a Jaundice, for which the Phyſician ordered

dered proper Medicines, by which it went off in ten Days, when he recovered his Colour again, and did not complain ſo much of the Pain in his Stomach; he had got little or no Paſſage by Stool from the Time he firſt complained, without the Help of Clyſters; but on the 24th of *March*, he took a kind of Looſeneſs, and paſſed a great Quanty of *Fæces*, which looked like boiled Blood, and ſome pure Blood, complaining much of the Pain in his Stomach.

On the 26th he paſſed a large Worm, a Foot and a half long, and an Inch and a half Diameter, when the Draught of it, which I ſend you along with this, was taken by Mr. *Robertſon* the Limner, before ſeveral of the Maſters of the Univerſity. It had been conſiderably larger at firſt; but ſo ſoon as he had paſſed it (which he could not do till one in whoſe Houſe he ſtaid, pulled it from him) he was ſo much ſurpriſed at it, and afraid that it had been one of his Inteſtines, that he ſaid he cut off about an Inch of its Tail, and gaſhed it in one or two Places with a Knife, to ſee what was in it, by which a great deal of Blood ran from it; as there did alſo after it had been waſhed ſix or ſeven Times in Water. He loſt a great deal of Blood along with it, to

Ap-

Appearance ſome Pounds, and for ſeveral Days paſſed ſome grumous Blood.

The Worm was dead when he paſſed it, and made up of a great many Rings like the Earth-worm; the Interſtices between each Joint were rather larger than as they appear in the Figure, and were of a dark Chocolate Colour; the Joints themſelves more pale, or rather of a livid Fleſh-colour: The Head was conſiderably ſmaller than the Body, though made up of Joints, and very much reſembled a Duck's Bill. It was flatter on the under-ſide, with a kind of Band, running all along from the Neck, which joined the Head and Body together to the Tail, into which all the Rings and Joints ſeemed to terminate, reſembling pretty much the one that runs along the upper Side of the *Colon*. It had a triangular Mouth, like the Horſe-leech. After he paſſed it, he ſtaid in this Place till the 26th of *April*, when he ventured on a Journey to *Aire*, and grew gradually better, though frequently complaining of Pains in the Region of the Stomach all the Time. From *Aire* he writes he has paſſed another, rather larger than the firſt, but it came away all in Pieces.

I have no Author who gives an Account of any ſuch Worm, only Dr. *Daniel Clerc*

in his *Hiſtoria Latorum Lumbricorum, cap.* xiii. (*a*), that Section where he treats of the *Res inanimatæ vermibus ſimiles*, reprehends *Maroja*, Phyſician to the King of *Spain*, for relating the Hiſtory of ſuch an one. His Words are, *Verum craſſius etiam allucinatus eſt Cyprianus Maroja, Philippi quarti Hiſpaniarum regis medicus, cujus hæc ſunt verba* (b), *Quidam æger, qui per infernam alvum ejecit lumbricum mortuum, & ſimul cum ipſo vitam amiſit. Erat tamen Lumbricus longitudinis viginti digitorum, & rotundus, & in rotunditate æquabat magnitudini carpi manus hominis robuſti. Erat ſangine plenus: & in vaſe teſtaceo immiſſus, facta ſanguinis expreſſione, rejecit à ſe plus quam unam ſanguinis libram cum dimidia*, &c.

TAB. IV. *Fig.* 1. ſhews the upper Side of the Worm.

A B C D, The Head.

C D, The Neck by which it was joined to the Body: The ſmaller Rings repreſent the Hollows formed by the joining of the protuberant annular Surfaces.

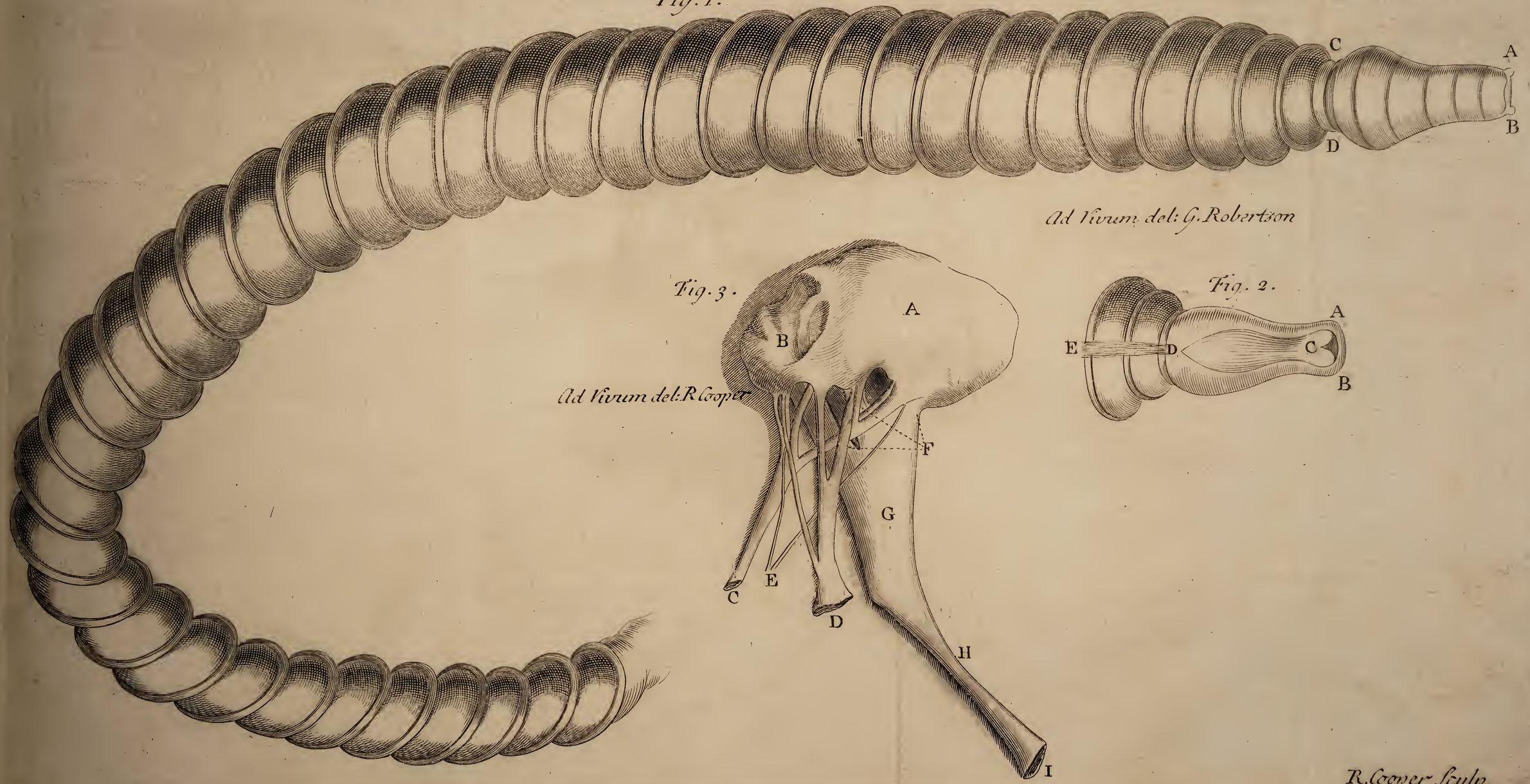
Fig. 2. Repreſents the under Side of the Head, and two Rings of the Body.

A

(*a*) Pag. m. 280. (*b*) De morbis internis, lib. 4. cap. 16.

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Fig. 1.



Ad Vivum del: G. Robertson

Fig. 3.

Ad Vivum del: R Cooper

Fig. 2.

R. Cooper Sculp.



A B C, Its triangular Mouth.

D E, Part of the Band that runs along the whole Body on its under Side.

XXVII. *Inability of Coition from the Piles*; *by* WILLIAM COCKBURN, M. D. *Fellow of the Royal Society, and of the Colleges of Physicians of* London *and* Edinburgh.

A Woman related to one of the moſt eminent Midwifes in this Place, had ſuch an intolerable Pain when ſhe had any Commerce with her Husband, as rendered the Action impracticable. The Midwife having a great Opinion of the late Dr. *Hugh Chamberlain*, deſired his Aſſiſtance for this unhappy Woman. He judged her Caſe to be a Cancer of the Womb, and ordered her what he thought beſt for her Relief. She was frequently purged, made Uſe of Fomentations, beſides alterative Medicines.

This Method was continued for ſome time, but finding no Relief that Way, Sir *David Hamilton* was afterwards adviſed

with; and no Eaſe coming from that Quarter, my Aſſiſtance was deſired.

The unfortunate Woman made no great Complaints of Pain, but in the Time of Coition. Mrs. *Cotton* examined the Womb, and could not find any Diſcharge from it, nor any Hardneſs, Scirrhus or Calloſity about the Neck of the Womb. Now as that Part appeared to be blameleſs, I found ſhe was troubled with the inward Piles; and they were kept much upon her, with the Purging and other Adminiſtrations; I ſuſpected that the Pain in Coition proceded altogether from preſſing the Piles, when the *Penis* ſtretched out the *Vagina*.

On that View I attempted the Cure of the Piles, and with ſo great Succeſs, that at once ſhe was cured of her Diſeaſe, and admitted of the Embraces of her Husband without any further Complaint; ſo neceſſary it ſometimes is to attend minutely to the Situation of Parts, as well as the ſuppoſed Affection, or the Methods of Cure.

XXVIII. *Jaun-*

XXVIII. *Jaundice from Concretions; by Dr.* THOMAS SYMPSON, *Profeſſor of Medicine, in the Univerſity of St.* Andrews.

THE Hiſtories of icterick Caſes, which confirm the Account of the Jaundice, depending moſt frequently on Concretions lodged in the bilary Ducts, as is argued for in *Art.* XXXIII. of your firſt Volume; ſuch Hiſtories, I ſay, are to be met with in great Numbers in Obſervators; but are generally told ſo ſuperficially, that they ſerve very little to explain the *Phænomena* of the Diſeaſe; and therefore the following Caſe I hope will not be unacceptable, ſince it illuſtrates pretty accurately a general Doctrine which you have thought to merit the Attention of the Publick.

Mrs. *Forbes*, aged about Forty, the Mother of ſeveral Children, of a ſanguine Conſtitution and ſedentary Life, about the Beginning of *April* awak'd in the Night with an acute Pain at the *Scrobiculus Cordis*, and Part of the Back oppoſite to it; a quick, hard and full Pulſe, great Sickneſs, unſatiable Thirſt, exceſſive Heat; no Food how-

however mild ſtaid upon her Stomach; without taking any thing, ſhe had frequent Reachings and Vomiting. The Blood, which was let plentifully from the Arm for theſe Symptoms, was Rheumatick to a great Degree. The fourth, fifth, and ſixth Days of her Trouble, ſhe raved, had the Hiccup, and fainted frequently. The three following Weeks, wherein ſhe was often bled and received Clyſters, as ſhe had done from the Beginning, the Symptoms became eaſier; but about this Time we obſerved her whole Body coloured with a deep yellow, and that every thing put into her Urine, came out coloured the ſame Way, while what ſhe paſſed by Stool was white: This determined me to venture her with a purgative Infuſion of *Senna* and *Rhubarb*; after which we obſerved her Stools for ſome Days coloured, tho' the Skin was little changed, and all the Symptoms abated. Shortly after they made a new Attack upon her, attended with vomiting, Pain at the *Scrobiculus*, a ſmall Uneaſineſs at the Region of the Liver, univerſal Itching, Feebleneſs and Oppreſſion without the Fever, and other ſevere Symptoms, which took Place at firſt; the Potion was again adminiſtrated with the ſame obſervable Succeſs as formerly; but, ten Days after, a third

Attack

Attack of the ſame Nature with this laſt was made, which yielded nothing to the Phyſick, though ſeveral Times repeated; wherefore I now ordered her Pills of *Venice Soap* and *Aloes* equal Parts, to be taken gradually till they ſhould produce a Looſeneſs: Upon their operating, ſhe was ſenſible of a Pain ſtriking from the Region of the Gall-bladder towards the *Linea alba*, as ſhe had frequently felt before, and accidentally viewing her Stools, ſhe found them bilious, with ſome kind of compact diſtinct Bodies ſwimming in them, moſt of them bigger than Peaſe; nine were found at this Time, and as many the next Day, the Purging being ſtill continued; and now the Symptoms greatly remitted, but returned again in a few Days; in which Fit, continuing her looſe Belly, ſhe paſt two of the ſame Bodies; and in a following Fit, which was a few Days after, four; And we obſerved, that every Time the Symptoms remitted, the Stools were bilious.

After theſe ſhe had full three Weeks Interval, with conſiderable Eaſe; but then ſhe had one of the worſt Fits ſhe ever had, except the firſt, ſhe being feveriſh, and vomiting under it, *&c.* I being from home, ſhe got nothing until the third Day, wherein ſhe took her Pills, purged, but nothing

appeared; next Day ſhe rode, to no Purpoſe; the fifth Day her Pills were repeated, ſhe purged, and paſſed a Stone as large as a Bean, of a priſmatick Figure, impreſſed on one Side, as if another Stone had been adhering to it, which I found to be the Caſe of ſeveral ſhe had formerly paſſed: After which ſhe continued ſometimes riding, purging, bathing in warm Water, and has now recovered her Health, without any further Moleſtation from the Jaundice.

The Stones paſſed were of a brown colour, finely poliſhed; ſo that they felt ſmooth and oily like Soap: They differed much in Figure, and were all angular and irregular, except two, one of which was of a priſmatick Figure, as above, and the other exactly triangular, with two equal Sides: When divided, they appeared compoſed of different Cruſts, tho' theſe were not perceptible near their Middle: They were bitter to the Taſte; and (except ſome of the biggeſt, which equalled a Hazel-Nut) they all ſwam in freſh Water, the biggeſt deſcended ſlowly. The Number we got in all was twenty ſix; but we ſuſpected ſeveral beſides had paſſed in the firſt Fits, before the Stools were examined; and we reckoned not without ſome Reaſon, ſince we never found the Fit to yield afterwards, with-

without meeting more or fewer of theſe Concretions.

XXIX. *Jaundice, with Suppuration of the Liver*; *by Dr.* JAMES DUNDAS, *Fellow of the Royal College of Phyſicians in* Edinburgh.

A Gentleman of a thin Habit of Body had been thrice ſeized with the *Jaundice*, from the forty fifth to the fifty ninth Year of his Age; this Diſeaſe being each Time preceded, for ſome Months, with ſharp deep-ſeated Pains of the *Epigaſtrium*, which began three or four Hours after eating, eſpecially after ſolid Food, and continued an Hour or longer.

Theſe Pains were for moſt part uneaſy to him while the *Jaundice* remained, which was near a Month, but decreaſed as the Diſeaſe went off; tho', for two or three Weeks thereafter, a full Meal of ſolid Food uſed to occaſion a Return of the Pains.

From the laſt Attack of the Pains, which happened about ſeven Months before his Death, his Fleſh waſted conſiderably, without

out any Diminution of his Strength, till the Jaundice had its ordinary Courſe; ſoon after which, the Patient having gone to the Country in the Month of *March*, and having uſed much Exerciſe there, enjoyed very good Health for ſix Weeks.

Towards the End of *April*, after having rode ſome Miles in a very cold Day, he felt a conſtant internal Pain in the right *Hypochondriac* Region and in the *Epigaſtrium*; which laſt increaſed upon eating ſolid Food.

Theſe he did not much regard, but took an *Anderſon*'s Pill, which he commonly uſed when coſtive. This Purgative occaſioned a *Diarrhæa*, which confined him ſome Days to the Houſe.

The Looſeneſs being ſtop'd, he rode out after Dinner, on the fifth Day after the Beginning of this Relapſe, the Weather being very cold. At his Return home, the Pains were much more violent, and were attended with a great Heat and Thirſt, difficult Breathing, an ill Taſte in his Mouth, want of Appetite, with a Sickneſs, as he called it, ſometimes in his Stomach; and he could not ſleep at Night.

Next Day the Jaundice appeared, and the former Symptoms having increaſed, he was confined to his Bed.

The

The Symptoms became ſtill more violent the two following Days; and on the ſecond of them his Pulſe intermitted, and he had a ſevere cold Fit, with great Trembling, both Evenings.

Next Morning, which was the ninth Day from the firſt Attack of this Diſeaſe, I firſt ſaw him, his Pulſe was ſtrong, full, a little frequent, and intermitted at the eighth, twelfth or ſixteenth Stroke; his Breathing was quick, but leſs difficult than it had been: His Skin was very warm, and he complained of very great internal Heat. The Pains were much abated, and ſcarce troubled him, except at a large Inſpiration. The Pain in the right *Hypochondre* was ſh. rp, upon lying on the left Side. He had ſometimes a Pain about the right *Clavicle*, which he told me had been more frequent the Day before. He was ſenſible of a Weight in the right *Hypochondre*, and his Stomach was much oppreſſed by every Thing he ſwallowed. His Urine was in ſmall Quantity, very high-coloured, and ſoon became turbid. The Colour of his Skin was not ſo yellow as it had been: I cauſed eight Ounces of Blood to be let, which ſoon was covered with a thick inflammatory Cruſt of a yellow Colour. I then ordered him to take every Hour two Ounces of

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an aperient Decoction, a little warm, and to waſh it down with a Spoonful of a mild acidulated cordial Mixture. At Night I preſcribed a gentle hypnotick Draught, which procured him Sleep all Night.

On the 10th he was again blooded, and his Blood had the ſame Appearance as formerly. The Draught having been neglected this Night, he did not ſleep well.

When I viſited him again on the 11th, he complained of a pretty ſharp Pain in the right *Hypochondre*, but the other in the *Epigaſtrium* ſeldom was uneaſy to him. The Heat of his Skin was much leſs, tho' he affirmed the internal Heat was much the ſame. He had ſome Appetite, and Food did not oppreſs his Stomach. His Tongue was covered with a Cruſt of a browniſh white Colour. His Urine was more plentiful, and not of ſuch a deep Colour, ſoon letting fall a lateritious Sediment. His Pulſe was weaker and ſmaller, and free of Intermiſſion in the Forenoon, but in the Afternoon was unequal in the Strength and Fulneſs of the Stroke.

I continued the former Preſcriptions, and deſired he might take ſome *gummous cardiac Pills*, with Soap and a *terebinthinat Clyſter*, Morning and Evening, and cauſed all the pained Parts to be covered with a

Plaiſter

Plaiſter compoſed of the *Melilot* and *Diachylon cum Gummi* Plaiſters and *Gum Ammoniac* mixed.

From this Day his Urine ſettled well, and had a great Quantity of a lateritious Sediment; and he always ſlept well, except when his Pacifick was omitted.

I ſaw him again on the 13th at Night; his Pulſe was then leſs frequent, equal, ſtronger, and more full, but intermitted at every thirtieth or fortieth Stroke. His Reſpiration was freer. The Heat of his Skin was moderate, and his Senſe of internal Heat much leſs. The Weight at the right *Hypochondre* was much diminiſhed. He felt no Pain, and could ly more eaſily on his left Side. His Thirſt was leſs, and he ſat up while his Bed was making. He had had four looſe Stools in this and the preceding Day.

Next Morning his Pulſe was free of Intermiſſion, ſtronger and leſs frequent; the Reſpiration eaſy. He felt no internal Heat nor Weight, and lay eaſily on the left Side. The yellow Colour of his Skin and Eyes was conſiderably leſs.

This Day and the following, his Reſpiration ſometimes was difficult, and his Pulſe had Intermiſſions. He ſlept much, and had no Stool till his Clyſters were repeated.

The

The quieting Draught having been omitted on the 15th at Bed-time, he was reſtleſs all Night, and complained of Heat.

When I ſaw him the following Afternoon, his Pulſe was quicker, larger, ſtronger, and equal; the Heat of his Skin moderate; but the Complaints of internal Heat were again renewed; his Reſpiration was quick and difficult; his Spirits were much oppreſſed, and he frequently ſighed. The Cruſt of his Tongue was moiſt, and of a light-brown Colour; his Urine turbid, as from the 14th. He had a copious Stool in the Evening; after which I cauſed a bliſtering Plaiſter to be applied to his Neck and Shoulders, and repeated his Draught with the uſual Effect.

In the Morning after, he was more chearful and free of Sighs, his Spirits lively, his Pulſe leſs frequent, and Breathing freer and ſlower; the Senſe of internal Heat much abated; the Cruſt of his Tongue was dry, and of a dark-brown Colour; the Yellowneſs of his Skin, *&c.* was leſs; his Urine of a deep Citron Colour.

In the Forenoon of the 19th Day of his Diſeaſe, he was perfectly eaſy: In the Afternoon he ſlept ſome Hours; and about Six he awaked, with an exquiſite Pain in his Belly; which was ſoon followed with

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a continual vomiting of a black moſt viſcid Liquor, and with very difficult Breathing. Theſe Symptoms put an End to his Life in a few Hours.

When his Body was opened next Day, a conſiderable Quantity of purulent Matter was found in the Cavity of the *Abdomen*, which we judged to have come out of three Abſceſſes we obſerved in the Liver; the firſt was a large one, formed on the ſuperior convex Part of the large Lobe, near the *Coronary* Ligament; the external Coat of the Liver, which had been raiſed here into a Bag, was much thickened, very tender, and moſtly white, but in many Places red, as if it had been injected. The ſecond Abſceſs was near the inferior Margin of the ſame Lobe; and the third was near the Gall-Bladder. The external Membrane of the Liver was much inflamed in many Parts of the convex Side of this Bowel; and the Subſtance of the great Lobe was very tender.

The Gall-Bladder was very tender, and contained eight calculous Concretions, of different Bigneſs and Shapes; the largeſt was flat, and about the Bigneſs of a Turky Bean; the ſmalleſt was not ſo large as a Grain of Barley. They were of a black Colour externally, but were of a browniſh-

grey

grey within; and some of them had a *Nucleus* of a white Substance. These Stones floated in a great Quantity of a thick dark-brown or blackish Humour, resembling *Mum* in Colour and Consistence. The Stomach also contained a great Quantity of the same Liquor, was much inflamed, with Numbers of red Points; and at its *Fundus* and left Orifice, the Vessels appeared as if they had been injected. No *Rugæ* were observable on its internal Surface. The *Colon* was also inflamed.

XXX. *An extraordinary large Gall-Bladder and hydropick Cystis; by Mr.* Joseph Gibson *Surgeon in* Leith, *Member of the Society of Surgeon Apothecaries of* Edinburgh, *and City Professor of Midwifery.*

William Gordon, of a healthy Habit, when about twelve Years of Age, in *October* 1721, fell from a Wall of three Yards perpendicular Height a-cross an old Tree, on which his right Side struck; and he immediately complained of an acute Pain all over the Bastard Ribs of that

that Side; but by repeated Blood-letting, it decreased into an obtuse heavy one, or rather a Sense of Weight; which not being so considerable as to confine him at home, or to restrain him from Play, was not taken further Notice of by his Relations, till after some Months, when he was observed to grow lean, to eat little, and to be less fond of Diversions than usual; which giving the Alarm, he was advised to go to the Country, and to be put on a Diet of Whey, with riding on Horseback: Both which (the Season favouring) he followed, and returned to Town after Harvest in seeming good Plight, without any other Complaint than a little Weight or Weariness, as he expressed it, in both his Sides, upon running, or any violent Exercise; but had not been long at home, till I was consulted about him. He then complained of the Pain in his right Side, had lost his Flesh and Colour, and was become exceeding slothful. A few Weeks added a long Train of other yet more direful Symptoms; for he suffered a constant Pain in his Stomach; vomited often, drank much, had his Tongue parched, his Skin dry and hot, his Pulse was frequent and feeble, his Urine crude, and in small Quantity; his Belly very costrive, and what Excrements he voided

were white; he breathed quick; his Legs pitted towards the Evening; and a hard circumſcribed Swelling began to appear in his right Side, and increaſing daily, ſtretched itſelf over the *Scrobiculus Cordis*, to the left *Hypochondrium*, raiſing the under Part of the *Sternum*, and forcing outwards the falſe Ribs of both Sides.

His Legs, which only pitted towards the Evening, during eight Months after his Fall, were in *November* 1722, conſtantly ſwelled, as were his Thighs and Belly. About the Middle of *January* following, Water was felt fluctuating in his *Abdomen*, and, till the Beginning of *April* thereafter, all his Symptoms increaſed daily, eſpecially the Difficulty of breathing, which did not allow him to ſit, far leſs to ly down; but ſome Days before his Death he was obliged to ſtand erect, ſupported by Chairs, Tables, or the People about him, while he ſlumbered.

This melancholy Situation made him beg ſo earneſtly for Relief in breathing by Tapping, that I yielded to his Importunity; tho gh I had always aſſured his Relations, there were no Hopes of removing his Diſeaſe by that Operation, becauſe the Dropſy was of the incyſted Kind, and the Water was inclofed in Veſicles. Having applied a laced

laced feneſtrated Bandage, ſupported by a Scapular, in order to prevent the Faintings which commonly do enſue, and have often proved fatal, upon drawing off at once all the Waters contained in the Belly of hydropick People, without this or ſome ſuch Precaution. I placed my Patient in the moſt convenient Poſture his Caſe would admit; and in Preſence of Mr. *Edward Hawkins* Surgeon to my Lord *Delorain*'s Regiment, and of Mr. *Adam Lindſay* Chirurgeon-Apothecary in *Edinburgh*, I drew off by the Trocar near three *Scots* Pints or twelve Pounds of Water, of a greeniſh Hue, having a groſs Sediment of the ſame Colour. The lower Part of his Belly ſubſided to very near its natural Dimenſions after this Evacuation; but its ſuperior Part did not in the leaſt diminiſh. While the Waters ran out, the Bandage was proportionally ſtraitned as his Breathing would permit, and the Wound was dreſſed as uſual. He died the ſecond Day after the Operation, being the 3d of *April*, and I was allowed to inſpect his Body on the 5th.

I was aſſiſted in the Diſſection by one of the Gentlemen preſent at the Operation, and by Dr. *James Crawford* late Profeſſor of *Hebrew* and Medicine in the Univerſity of *Edinburgh*, whoſe univerſal Literature,

and conſummate medical Knowledge, joined to all thoſe amiable Qualifications which make up the beautiful Character of a good Man, and ſincere Friend, muſt make all who had the Happineſs to know him beſt, to bemoan with me their own private, and regrete the publick Loſs of him.

When the *Peritonæum* was cut open, the Contents of the *Abdomen* had ſuch a different Appearance from what they uſually bear, that we had the greateſt Difficulty to diſtinguiſh the *Viſcera*. The *Omentum*, which was firſt in the Way, was not at all fatty, but had its Blood-veſſels very conſpicuous, and ſome other Veſſels, that were exceeding ſmall and numerous, were obſerved on it, which we took to be the *Ductus Adipoſi Malpighii*. At the lower Part, where the Caul is ordinarily free, it adhered ſo very firmly to the Inteſtines, that it could ſcarce be ſeparated without tearing.

The Stomach was rather leſs than ordinary, and was preſſed by the Gall-bladder and Spleen, into an oblong Form, not much unlike the *Cæcum*.

The Inteſtines and other *Viſcera* of the *Abdomen* (the Liver, Gall-bladder, and Spleen excepted) appeared almoſt as uſual, only

only were more tender, ſcarce bearing the Touch.

The Liver was not much bigger than ordinary, but its convex Part adhered ſo intimately to the Diaphragm, as it was impoſſible to ſeparate them without the Help of the Knife. When this *Viſcus* was cut, a great Number of ſpherical Tubercles, about the Bigneſs of a common Bean, appeared in its Subſtance: Some of the Gentlemen then preſent, were inclined to eſteem theſe to be Glands; but how juſtly, I am not to determine. It was obſerved that they had no Veſſels either entring in or going out from them, and ſeemed only to be ſet looſe in the Subſtance of the Liver.

The *Gall-bladder* was continuous to all the concave Part of the Liver, and was extended to a moſt ſurpriſing Bulk; for it contained no leſs than two *Scots* Pints, or eight Pounds of Bile, rather thicker than the Cyſtick generally is, and of which ſeveral concentrical Bags, incloſed one within another, were formed; theſe had all the internal Figure of the *Gall-bladder*, and differed from each other only in this, That thoſe which were next to the *Veſica*, were firmer and more opack, while the more internal were of a lighter green Colour, and of a more tender Subſtance.

The *Ductus communis cholidochus* was larger than uſual, and was filled with many ſmall ſpongy Stones of a yellowiſh Hue that ſwam in Water.

The Spleen was natural in its Subſtance, but adhered to the Diaphragm as the Liver did; and it had an additional Coat from that Part of the *Peritonæum* which covers the Diaphragm. This and the common external Coat formed a preternatural *Cyſtis* that contained three *Scots* Chopins, or ſix Pounds of a clear *Serum*, without Smell, but exceeding ſalt, and not coagulable.

The Liver and Spleen were continuous, by a ſmall Lobe that went from the lower Edge of the Liver under the Stomach, and terminated membranous into the *Cyſtis* of the Spleen.

This extraordinary *Gall-bladder*, and preternatural *Cyſtis* annexed to the Spleen, are ſtill in my Poſſeſſion, ready to be ſhown to any of you who will take the Trouble to examine them.

I ſhall not tranſgreſs your Rules, by ſubjoining any theorical Account of this Boy's Symptoms; but beg Leave to be allowed to apply this Hiſtory to that excellent Eſſay of an anonymous Author on the Jaundice, which is the XXXIII. *Article* of your firſt Volume.

Though

Though at firſt View of the Caſe I have related, it ſeems to contradict what is argued for in that Article, by the Boy having no icterick Symptom, notwithſtanding the cyſtick Bile was prevented from paſſing down into the Inteſtines, by Stones lodged in the *Ductus cholidochus*, and the *Gall-bladder* was ſo full of it, yet when we conſider how very viſcid this Boy's cyſtick Bile was, that it was formed into concentrical Bags, and therefore could not regurgitate, or be reaſſumed into the Blood-veſſels, which the Author of the Eſſay always ſuppoſes neceſſary for occaſioning the Jaundice, this Hiſtory will rather appear favourable to his Opinion.

XXXI. *An uncommon Suppreſſion of Urine, with a preternatural Size of the Kidney; by Mr.* GEORGE BALDERSTON *Chirurgeon-Apothecary in* Edinburgh.

A Woman about thirty five Years of Age, frequently complained of *Nephritick* Pains for two Years, and often paſſed Sand with her Urine. In *Auguſt* laſt ſhe

was carried home from the Harveſt-field, having been laid aſide from Work, by a violent Pain of the right Kidney; ſhe was ſoon relieved by a Clyſter, and paſt a few ſmall Stones. Ten Days after, ſhe was taken ill again in the ſame Manner, when in one Morning ſhe paſt twenty five ſmall Stones, and three or four at a Time of the ſame Size, for ſeveral Days afterwards. Through the Winter ſhe conſtantly vomited ſolid Food immediately, but kept Liquids for moſt Part till Bed-time. Her Pains frequently returned; but no Stone appeared, till about three Weeks before her Death, that ſhe paſt three or four more in a Morning, and was ſoon after ſeized with a Suppreſſion of Urine, which continued almoſt total for fifteen Days; having in that Time not voided above a Gill of Water, and that only by Drops, deeply tinged with Blood, and attended with the utmoſt Pain and Uneaſineſs: Her Belly at the ſame Time was much diſtended, and pained, eſpecially about the Navel and *Regio Pubis*.

In this Condition I found her at my firſt Viſit on the 16th of *May* 1733. I immediately ſounded her, and imagined I found a Stone, which eaſily yielded to the *Catheter*; ſhe felt immediate Eaſe, though ſhe voided but a few Drops of Urine, and

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on withdrawing the *Catheter*, I perceived a conſiderable Reſiſtance, as if one had been pulling againſt me. In the Afternoon ſhe was ſeized with a violent Pain in the right Kidney, and Ureter of the ſame Side. I ordered her a Turpentine Clyſter, and a pacifick Mixture to be taken as ſoon as it was paſt: About ten that Evening ſhe voided half a Mutchkin of Urine, and was much eaſed both of the Pains, and Diſtenſion, and Swelling of her Belly.

Next Day ſhe was free of Pain, but very ſick, and vomited whatever ſhe took. I cauſed her to drink plentifully of a Decoction of *Althea* Root, moſt of which ſhe threw up: In the Evening ſhe got a Turpentine Clyſter, and was ordered to take the pacifick Mixture after it was paſt, but ſhe kept the Clyſter all Night.

The Day following, finding the Clyſter ſtill remained in her Body, I ordered her a Pound of a Ptiſan of *Senna*, *Tamarinds*, and *aperient Roots*, of which ſhe drank a Gill every Hour while it laſted. She vomited moſt of the Ptiſan, which however, about ten at Night, procured her two Stools. She got the Paregorick immediately after, and had an eaſy Night.

She paſſed the 19th Day pretty eaſily, without taking any Medicine.

On

On the 20th the *Ptiſan* was renewed, with the Addition of *Rhubarb*; but ſhe threw it up ſo quickly, that it had little Effect on her Belly: The vomiting encreaſed towards Evening, when I gave her a Stomachick Opiate Mixture, with *Sal Abſinth.* and *Syrup Limon*, to be taken in Spoonfuls, and ſometimes a Glaſs of *Rheniſh* Wine. The Pain ſhe formerly complained of at her Navel and *Regio Pubis* now removed to the Stomach, and ſeized chiefly its upper Orifice.

On the 21ſt before Noon, the vomiting ceaſed, and returned no more; ſhe continued the Mixture and *Rheniſh* Wine, and took a little Bread-berry; but her Breathing became laborious, aud wheezing, tho' her Pulſe continued calm and ſtrong, as it had been all along. About four after Noon ſhe was ſeized with Convulſions ſo ſtrong, that four Women could ſcarce keep her in Bed: Soon after her Pulſe became weak and irregular. About two in the Morning ſhe had a ſecond Convulſion, which brought Blood from her Mouth: After which ſhe lay calm, but ſunk gradually till ten before Noon that ſhe died.

During the whole Courſe of her Diſeaſe, ſhe never could ly on the left Side, but was all

all along free of Pain both of left Kidney and Ureter.

Upon opening the Body before Dr. *Andrew Sinclair*, Profeſſor of *Medicine*, and Dr. *Moncrief*, we found the Muſcles of the *Abdomen* extreamly thin, a conſiderable Quantity of Water betwixt them and the *Peritonæum*; and likewiſe ſome Water in the Cavity of the Belly.

The Stomach was ſound; moſt of the ſmall Guts ſlightly inflamed.

The Liver very large, but not hard; the whole convex Surface of the right Lobe ſtrongly attached to the *Peritonæum*, the Extremity of its left Lobe contiguous to the Spleen.

The Spleen conſiderably larger, thicker, and ſofter than uſual.

The *Uterus* inflamed, with both its *Cornua* obſtructed by a tough white Matter of an unequal Conſiſtence.

The *Ovaria* much contracted, flat and white, without any *Ova*.

That Part of the *Peritonæum* which covered the right Kidney, of a very unnatural Thickneſs.

The right Kidney of a monſtrous large Size; the Blood-veſſels on its Surface very red and turgid. Upon making an Inciſion into its external convex Side, a ſmall Quantity

tity of *Pus* was found near the *Pelvis*; in the *Pelvis* itſelf was contained a large Stone, and a great Number of ſmaller ones of different Shapes and Sizes; none of them exceeding the Bulk of a common Pea, and none leſs than a great Pin's Head.

The *Ureter* on the right Side little above the natural Size.

The left Kidney ſo ſmall, that with Difficulty it was found; neither Stone nor Sand in any of three ſmall Cavities which it had inſtead of a *Pelvis*.

The left *Ureter* very large near the Kidney, then much contracted, and afterwards dilated again above the natural Dimenſion. See *Fig.* 3. which exhibites the Dimenſions both of Kidney and Veſſels.

There was nothing found in the Bladder.

Explication of Fig. 3. *TAB.* IV.

A The Kidney as large as the Life.

B One of the Cavities that ſupplied the Want of a *Pelvis* opened by Part of the Subſtance of the Kidney being cut off.

N. B. The three Cavities had no Communication with each other within the Kidney; and though there were ſome ſmall urinary Canals opened into each, I could not obſerve any *Papillæ*.

C The

C The Trunk of the emulgent Artery.

D The Emulgent Vein.

E The Nephritick Nerve. The Branches of all theſe Veſſels going to the Kidney, are delineated, but need no Explication.

F The Canals coming out from the three Cavities, to compoſe one large Sac G, at the Beginning of the *Ureter*.

H The *Ureter* preternaturally ſtraitned.

I The *Ureter* again dilated to the ordinary Size.

XXXII. *A Suppreſſion of Urine; by Dr.* FRANCIS PRINGLE, *late Preſident of the College of Phyſicians in* Edinburgh.

A Gentleman about ſeventy three Years of Age, of a healthy Conſtitution, and full Habit of Body, was ſeized on *Tueſday June* 22d, with a total Suppreſſion of Urine, attended with Pains about the *Os Pubis*, Region of the Loyns and Kidneys, and with frequent Vomitings of a darkiſh-coloured Subſtance, reſembling Coffee or Chocolate, he had alſo frequent Returns of the Hiccough, and complained of a ſcald-

ing

ing Heat, when he ſwallowed any Drink, eſpecially if it had the leaſt Acrimony.

He continued two Days in this State, notwithſtanding his having been let Blood by his Surgeon, who alſo gave him ſeveral Clyſters, and a Decoction of the aperient Roots, with *Sal Prunell.* for Drink.

Being called to him on *Thurſday June* 24. I immediately ordered him to be ſounded, and three Mutchkins and a half of a dark-coloured moſſy Urine were voided by the *Catheter*. After which the black Vomitings and Hiccough ceaſed; and he found ſo much Relief every Way, that he delayed the Uſe of the *Semicupium* which I had cauſed to be prepared for him; but he had emollient Terebinthinate Clyſters injected; and he continued the Uſe of the aperient diuretick Decoction, to the Materials of which ſome *Althea* Roots were added.

Next Day having paſſed no Urine, he was put into a *Semicupium*; and that availing nothing, he was again ſounded, and paſſed ſome leſs Quantity of Urine than was taken away before. While the Surgeon ſounded him, the *Catheter* met with little Reſiſtance; neither was there any Appearance of Stone, Ulcer, or Caruncle in the Neck of the Bladder; nothing came away with the Urine, except a Drop or

two

two of coagulated Blood, and ſome ſandy gritty Sediment.

He continued in this Condition, till the *Saturday* Evening, when he was obliged to be ſounded again; and his Pulſe being frequent, hard and ſtrong, with Heat and Thirſt, he was blooded. On *Sabbath* he was ſounded for the fourth Time, was again put into the *Semicupium*, and a laxative purging Ptiſan given, which anſwered well enough.

From the firſt Time he had been ſounded, the black Vomitings left him; but he was troubled with the Hiccough from Time to Time, which increaſed ſo much on *Tueſday June* 29th, being accompanied with a low depreſſed Pulſe, and Coldneſs of the Extremities, that it was judged proper to apply a bliſtering Plaiſter between his Shoulders at Night; and beſides the former Medicines, he was ordered to take frequently a Spoonful of the Solution of *Balſam Copayb.* to which ſome Gutts of the *Ol. Macis chemic.* diſſolved in Sugar were added. He ſlept well all Night, and was quite free of the Hiccough, and had a good Pulſe next Morning; but paſſed no Urine till the *Catheter* was again introduced. Upon removing the bliſtering Plaiſter, he felt ſome ſharp Pains, reſembling thoſe of a Strangury, which were probably owing to the

the Blister: He was therefore ordered to drink plentifully of the *Emulsio Arabica*, and at Bed-time, to take a Bolus composed of *Pulv. Rad. Valerian Silv. gr.* x. *Castor. Russ. Sal Succin. Camphor. ā gr.* v. *Extract. Opii. gr.* i. *Syrup. Cariophyll. s. q.* which eased his Pains, and procured him a pretty good Night. At the same Time he continued to take the Solution of *Balsam. Copaib.*

On the three following Days he continued much in the same Way, being sounded every Day to evacuate the Urine, which he never passed without the *Catheter*. *July* 3d, he was ordered to drink plentifully of *Piermont* Water and *Rhenish* Wine, and *Pareyra Brava* was added to his ordinary diuretick Decoction.

July 4th and 5th, there was scarce any Change; his Decoction, *Piermont* Water and *Rhenish* Wine were still continued. On the 6th, 7th, 8th, being a little stronger, he rode sometimes out in a Chaise, and continued in the Use of the same Medicines, only half a Drachm of the Oil of *Juniper*, and as much ætherial Oil of Turpentine were added to six Ounces of the *Copaiba* Mixture. On the 9th or 10th he had a gradual slow Discharge of more than a Pound of Urine, without the Assistance of the

the *Catheter*, which the Suppreſſion he had of Urine, put us under the Neceſſity of introducing every Day from the Beginning of his Diſeaſe, till the 17th or 18th of *July*, when he came to void his Water in the natural Way, and regularly. He continued the *Rheniſh* Wine, and Spaw-Water, with riding on Horſeback, or in a Chaiſe for ſome time, making rather more Urine than he was formerly in uſe to do, and continued a conſiderable Time in good Health, without having any Occaſion to be ſounded.

Afterwards this Gentleman was ſubject to frequent Returns of the Suppreſſion of Urine upon any Exceſs in his Bottle; and, five Years after, was attacked with the ſame Symptoms as formerly; but neglecting to call proper Aſſiſtance in due Time the Diſeaſe was ſo advanced, that it was very difficult to ſound him. In few Days a conſiderable Quantity of bloody Matter was brought away with the *Catheter*, the Fever and other bad Symptoms increaſed, and he died.

XXXIII. *An Account of medical Diſcoveries, Improvements, and Books publiſhed in the Year* 1731, *and omitted in the firſt Volume of this Collection.*

Diſcoveries and Improvements.

DR. *Stahl*, firſt Phyſician to the King of *Pruſſia*, recommends the *Eryſimum* or *Verbena fæmina* as a good Medicine for Schirro-cancrous Tumors, both when taken internally, and applied to the Tumor. Mr. *Bingert*, Surgeon at *Berlin*, communicates two Hiſtories of its good Effects in ſuch Caſes, *Act. medic. Berolin. Dec.* 3. *Vol.* 1. *p.* 59.

Morgagni confirms by ſeveral Experiments what *Burlet* had affirmed of *Aq. Calc.* not coagulating Milk. *De Bonon Art. & Scient. Inſtituto atque Acad. Comment. p.* 155.

The Powder of the *Fungus thyphoides coccineus Melitenſis* is recommended as a good and ſafe Styptick in *Hæmorrhagies*, *ibid. p.* 158.

Mr. *Le Dran* mentions ſeveral Examples of his Succeſs in curing white Swellings of the Joints, or Tumors occaſioned by a Collection of inſpiſſated Lymph, by

a

a ſmall Stream of warm Water falling from a Height upon them. When the Water is impregnated with penetrating Medicines, or natural Minerals, its Virtues are greater. Beſides the Uſe of theſe *Douches*, as he calls them, he alſo recommends the Application of Bladders, containing warm Water, to the Parts affected with ſuch Diſeaſes. *Le Dran Obſervations chirurgicales, Tom.* 2. *Obſerv.* 93, 94.

Mr. *Bailleron* Surgeon, affirms, that a Compoſition of Sulphur, Roſin, and Honey, proves an Eſcharotick Medicine, but gives little or no Pain, *ibid. Obſerv.* 100.

Morgagni has never yet fulfilled his Promiſe of publiſhing *Valſalva*'s poſthumous Works, which he propoſes to comment on, and add Notes to: But, by a ſhort Abſtract from his Papers now publiſhed, we may judge what Diſcoveries *Valſalva* is to treat of.

His firſt Diſſertation is to be on the Ligaments of the *Colon*, which other Authors, and particularly *Morgagni* has prevented him in.

Next, he treats of the Sinuſes of the *Aorta*. By *Sinus* he means any Part of an Artery, where its Sides are ſtretched outwards beyond the ordinary proportional Dimenſions elſewhere. He obſerves four ſuch *Si-*

nuſes, three of them anſwer to the ſemilunar Valves; and the fourth is all that Part of the *Aorta* between the former *Sinuſes*, and the Origin of the common Trunk of the right ſubclavian and carotid Arteries.

He then gives ſome Reaſons why the *Nervus acceſſorius*, aſcribed commonly to *Willis*, ſhould not be ſaid to have its Origin where the common Deſcriptions place it, but ſhould on the contrary be thought to riſe from the eighth Pair, to be joined to the *Medulla ſpinalis*.

Valſalva calls that Ring, which the Muſcles of the Eye make round the optick Nerve at the Bottom of the Orbite, by the Name of the *Moderator Ring* of that Nerve, alledging that the exterior Fibres of theſe Muſcles, which riſe from the Nerve, muſt ſhorten it when they contract; and when the interior Fibres act, they muſt compreſs it; ſo that theſe different Fibres of the Muſcles affect the nervous Fluid here very differently. Thereafter he accounts for ſeveral *Phænomena* of Viſion from this Structure. He alſo deſcribes ſuch another Ring made round the Motory Nerves of the Eye; but acknowledges that it is neither ſo remarkable or diſtinct as the former.

The laſt Treatiſe mentioned by *Morgagni* is the one wherein *Valſalva* endeavours

vours to prove the *Renes ſuccenturiati*, or *Glandulæ renales* to be Organs of Generation, or aſſiſtant to them. *Valſalva* had endeavoured to ſecure the Honour of this Diſcovery to himſelf, by entring a publick Proteſt, that no other ſhould claim it. Mr. *Ranby*, Surgeon to the King of *Britain*'s Houſhold, ſuſpected that the Duct, which the *Italian* literary Journals mentioned as the principal Part of this Diſcovery, was no other than an Artery ſent off from that of the *Capſula* on each Side, to the Teſticles of Men, and *Ovaria* of Women. (See *Phil. Tranſ. Numb.* 387. § 3. and *Numb.* 395. § 12. (*a*) *Morgagni* has now explained *Valſalva*'s Doctrine more fully.

Valſalva gives the following Reaſons for his Opinion of the *Renes ſuccenturiati* being aſſiſtant in Generation, by Means of their excretory Ducts. He obſerves the ſeminary Veſſels of ſeveral Fowls to come out from theſe *Capſulæ*, before they are ſent from the Teſticles. In the *Viper* and *Water-Tortoiſe* he remarks ſuch membranous Connexions between the *Renes ſuccenturiati* and Teſticles, as make it probable that ſuch Excretories are ſent through

(*a*) We beg Mr. *Ranby* would determine whether the Artery he deſcribes is conſtantly or ſeldom found.

the *Capſulæ* to the Teſticles. He affirms his having ſeen Veſſels that were neither nervous, ſanguiferous nor lymphatick, going from the human *Capſulæ* to the *Teſtes*. His Obſervations are much the ſame as to Females. To theſe he ſubjoins the Conſent and Sympathy obſerved by Phyſicians between the Loyns, and the natural or genital Parts. To confirm all, he relates the following Experiment: He cut away one Teſticle, and extirpated the Kidney of the oppoſite Side of a Whelp. The Wounds healed, but the Creature was of a very lax Habit, and was ſo far from attempting Coition with Bitches, that he did not ſeem fond of them when they were proud, *Acad. Bononienſ. Comment. p.* 376. *&c.*

Petrus Nannius, after giving ſome Examples of veſicular Bodies found in the conglomerate Glands, which, he thinks, ſupport the *Malpighian* Scheme of Glands, endeavours to prove the Neceſſity of ſuch Veſicles for receiving all the different Particles required in the Compoſition of ſecerned Liquors, that muſt be conveyed in different Series of Veſſels, to be intimately blended in the Veſicle, which will be conſiderably aſſiſted by the Syſtole and Diaſtole, which he ſuppoſes the Veſicles to undergo. *Ibid. p.* 326. *&c.*

Do-

Dominic. Guſman. Galeatius having found ſmall black bilary Concretions contained in *Folliculi* of the Coats of the Gall-bladder concludes *Malpighius*'s Opinion of the Glands of the Gall-bladder to be thereby confirmed, *ibid. p.* 355.

Mr. *Lamorier* propoſes ſome Improvement on the Operation of the *Fiſtula lacrymalis*; for he deſires the *Os unguis* to be laid bare at the firſt Inciſion, and immediately after to pierce it with a Pair of ſtrong ſharp-pointed crooked Forceps, then to dilate the Perforation, by opening the Forceps. After the Inflammation is over, he would have a Piece of ſmall Wax Candle ſhaped like a Tent, introduced by the Wound into the Noſe, where he ſecures it by the other Dreſſings. He continues the Uſe of this *Bougie* till the Paſſage is made callous, and out of Hazard of reuniting, after which he allows the external Wound to cure. The Advantages he propoſes by this Method, are to abridge the Operation, and to ſecure a Paſſage for the Tears into the Noſe. *Memoire envoyè du Montpelier à l'Acad. des Sciences* 1729.

Mr. *Le Dran* Surgeon at *Paris* has mentioned ſeveral Improvements in Surgery, in his two Volums of Obſervations.

He cured a *Polypus* of the Noſe that he could

could not extract wholly, in the following manner, which may be practiſed for deſtroying all ſuch Excreſcencies. He introduced one Extremity of a large Seton, put on the Point of the Fore-finger of the left Hand, into the Patient's Mouth, till he brought it behind the *Velum pendulum* of the Palate, then ſliding a Pair of thin crooked Forceps, held in the right Hand, into the affected Noſtril, he catched hold of the End of the Seton, and brought it out at the Noſtril, leaving its other Extremity hanging out at the Mouth. Every Day he ſhifted the Part of the Seton in the Noſtril, after covering what was to be introduced into the Noſe with a ſuppurant Medicine. While he drew the Cord, he endeavoured to preſerve the poſterior Edge of the *Velum pendulum* from being hurt; by introducing his Finger into the Mouth, and ſupporting the Cord upon it. He continued the Uſe of the Suppurant, till he was ſenſible, by the Patient's breathing freely through the Noſtril, that the Remains of the *Polypus* were deſtroyed, and then he injected Deſiccatives to cicatrize the Ulcer. *Tome* 1. *Obſerv.* 6.

In his Reflexions on this ſixth Obſervation, he propoſes to make ſuch a Seton ſerve for ſtopping *Hæmorrhagies* of the Noſe; for which Purpoſe he faſtens two

Doſſils

Doſſils to the Cord, and after drawing one out at the Noſtril, to bring away the clotted Blood, he continues to draw the Cord, and ſo fills up the poſterior Part of the Noſtril with the other, which ought to be larger, and well wet in a ſtyptick Liquor, by which not only the *Hæmorrhagy* may be ſtopped, but if it ſhould continue, the Doſſil will effectually prevent the Blood and Medicines put into the Noſe, from running down the Throat, which commonly occaſion a Cough or Vomiting that increaſes the Blooding. He confirms his Reaſoning by the ſubſequent Obſervation, which is an Example of the Succeſs of this Method.

In his Obſervations on Wounds of the Head, *viz.* from *Obſerv.* 15. to 29. he endeavours to ſhew how much more dangerous the Caſe is, when the *Cranium* does not break by violent Blows, *&c.* than when it is fractured, becauſe of the greater Commotion of the Brain, Contuſion of the Skull, and Separation of the *Dura Mater* in the former Caſe; and therefore concludes it neceſſary to perform the Operation of the Trepan oftner than is commonly practiſed.

In his Reflexions on the 31. *Obſerv.* he remarks, That whenever any conſiderable Quantity of *Pus* is contained in either Cavity of the *Thorax*, that Side will appear larger than the other. *Tom.*

Tom. 2. *Obſ.* 59. He deſcribes a *Biſtoury cachè* of his own Contrivance, for more ſafely performing the Operation for *Herniæ*. The Point of the *Biſtoury* does not come out of the Furrow of the Director, but ſlides in it, while the Edge of the Blade is raiſed, and there is a Wing or broad Plate that ſtands out on each Side of the Director, to keep down the Guts, and thereby to prevent the Hazard of their being cut.

Obſerv. 80. He aſſures us, That when a ſmall Stone is lodged in the Neck of the Bladder, the Patient only is pained in piſſing, till the firſt Drops of the Urine come away. When the Stone in the Bladder is large, his greateſt Pain is while the laſt Drops are evacuated; but when the Difficulty in urining depends on the Diſeaſes of the Coats of the Bladder, the Pain continues all the Time of the Evacuation. By obſerving theſe Symptoms, he has determined People to have no Stone in their Bladder, after ſeveral others had aſſured them there was a Stone; and his Opinion was confirmed by probing with the *Catheter*. He names one particular Inſtance of this in a Perſon who laboured under what he calls a contracted hardned Bladder (*veſſie retrecie & raccornie*) whom he cured after

after ſeveral Bloodings and Purgatives, by injecting into the Bladder the mucilaginous Decoction of *Rad. Alth. & Sem. Lini*, which he changed afterwards for Barley Water, with ſome *Melroſe*; for by theſe he removed the Pain, and brought the Bladder, which could ſcarce contain at firſt two Spoonfuls of Liquor, to the ordinary Capacity.

Obſerv. 112. He deſcribes the Amputation of the metatarſal Bone of the great Toe. He cut with a Biſtory between the affected metatarſal Bone and the one next to it, till his Knife paſſed beyond the carious Part, and even beyond the ſwelling of the Tegument; then introducing a furrowed Probe between the Bones near the poſterior Extremity of the Inciſion, he puſhed his Biſtory by the Help of it ſome Way between the Bones, and made a ſemicircular Inciſion upon the metatarſal Bone of the Great Toe, firſt above and then below, ſo as to make a compleat circular Wound, and to lay that Bone bare all round; and immediately taking out the furrowed Probe, he introduced a thin Plate of Lead in its Place, and with a fine Saw cut the affected Bone through, the next one being ſaved from any Injury by the Plate of Lead.

Mor-

Morgagni tells, That *Valſalva* ſhews, by ſeveral Reaſons and Examples, the *Cataract* to be a Diſeaſe of the cryſtalline Humour, and not a Membrane.

The principal Difference, according to him, between a *Cataract* and *Glaucoma*, is, that in the latter Diſeaſe the cryſtalline Humour becomes hard, and of a sky Colour (*glauci coloris*;) and in the former it is ſoft, *Comment. Acad. Bonon. p.* 378.

Dr. *Albertinus*'s Remarks on ſome Faults of Reſpiration, depending on the leſed Structure of the Heart and *Præcordia*, will not admit of ſuch an Abridgment as our Deſign allows; wherefore we muſt refer to the original Treatiſe, *ibid. p.* 382.

The ſame Gentleman obſerves, That all feveriſh Diſeaſes, nay almoſt all Diſeaſes, are followed by *Criſes*; and that particularly after intermitting Fevers are ſtopped by the *Peruvian* Bark, critical Evacuations are to be expected: If they do not come timely, the Patient is in Danger of ſome other Diſeaſe, eſpecially if any uſual or habitual Evacuation has been hindred. In which Caſe it is dangerous to give the Bark, unleſs we are on our Guard to promote a ſuitable Excretion, if a *Criſis* does not ſoon come naturally, *ibid. p.* 405.

Cajetanus Tacconus M. D. tried many Expe-

Experiments with the Mucilage of the Joints of Brutes and of Men both ſound and gouty, in order to diſcover whether the gouty Matter is *acid* or *alcali*; and concludes, that the Matter of this Diſeaſe is ſometimes of the one and ſometimes of the other Nature. The Signs by which he thinks they may be diſtinguiſhed are theſe: If the Gout produces no *Tophi* or Knots, or does it very ſlowly; and eſpecially if it is attended with oedematous Swellings, he pronounces it to depend on an alcaline Humour: But if the Knots are large, and quickly formed, he is of Opinion it is owing to an Acid. The Method of Cure muſt conſequently be very different according to the Cauſe, *ibid. p.* 148.

BOOKS.

UNleitung *zur hiſtorie der Medicinifchen. Gelahrtheit*, 4*to*, Jenæ.

Raccolta degli Opuſcoli ſcientifichi e filologici, Tom. 4. Venet.

Jo. Dominic. Civini, *Diſcurſus Academicus de hiſtoria & natùra Caffée*, 4*to*, Florentiæ.

Diſpenſatorium regium & electorale, Boruſſo Brandenburgicum, *Regii Collegii medici ſuperioris cura & opera denuo editum*,

tum, reviſum, emendatum & auctum, fol. Berolin.

Tractatus phyſicus, de tempeſtate, cui ſubjungitur obſervatio circa vaſa lymphatica ventriculi inſtituta. Auctore D. Jo. Wilhelmo Albrecht Med. P. *Erfurthenſi,* 8*vo,* Erfordiæ.

Petri Chriſtophori Burgmanni, *ſuccinctum Hypotheſios* Stahlianæ *examen, de anima rationali corpus humanum ſtruente, motuſque vitales tam in ſtatu ſano quam morboſo adminiſtrante,* 8*vo,* Lipſiæ.

Reflexions critiques ſur l'emmenologie de Mr. Freind, *par* Mr. Tellier *le fils, Medecin,* 12*mo,* à Paris.

Juſti Veſti M. D. *in Academia Erfurtenſi P. Inſtitutiones medicæ reformatæ nunc denuo publici juris factæ,* 8*vo,* Francofurt. & Lipſiæ.

Il medico in Mantoua, oppure qual metodo di medicare nelle palluſtri, e quale nelle cita montane convenga di Flaminio Corghi M. D. Mantoue.

Dilucidazioni Fiſico-mediche del Dottor Sancaſſini *tendenti à richiamare la medicina practica alla prezioſa Purità, in cui ce la laſcio il grande Ipocrate, con altri Trattati concernenti à tale importantiſſimo argomenti, fol.* Roma.

XXXIV. *An*

XXXIV. *An Account of the moſt remarkable* Improvements *and* Diſcoveries *in Phyſick made or propoſed ſince the Beginning of the Year* 1732.

THE *Small-pox* are generally believed to have been firſt obſerved and deſcribed by the *Arabians*; but Dr. *Hahn* endeavours to prove, in his Book intituled, *Variolarum Antiquitates è Græcis erutæ*, that the *Small-pox* was deſcribed by the old *Greek* Phyſicians under the Name of *Carbuncle*.

In the Epiſtle to *Fabricius*, tack'd to his *Variolarum Antiquitates*, the ſame Author uſes many Arguments to ſhew *Janus Damaſcenus* and *Meſue* the *Syrian* to be the ſame Perſon.

The *Peruvian Bark*, ſo well known as a Specifick in the Ague, is now diſcovered to be as effectual in the Cure of Mortifications from an internal Cauſe. The Hiſtory of this Diſcovery is: In 1715 Mr. *Ruſhworth* Surgeon in *Northampton* gave it to a Patient labouring under a Mortification; and

and, having afterwards other Proofs of its good Effects in this Diſeaſe, communicated his Diſcovery in 1731 to the Maſter and Governor of Surgeons-Hall at *London*. Serjeant *Amyand* ſoon tried it in ſuch Caſes, and found it ſucceſsful in ſeven. Mr. *John Douglas* confirms it by the Hiſtory of a Patient of his, which he publiſhed in 1732: And Mr. *Shipton* Surgeon, ſoon after, relates his Succeſs by this Medicine to the Royal Society in *London*. Mr. *Ruſhworth* and Mr. *Amyand* confine its Uſe to Mortifications from an internal Cauſe; and the former Gentleman thinks it is not proper in all Caſes of that Kind, particularly where there is no Intermiſſion of the Fever, when only he adviſes it to be given. Mr. *Douglas* ſeems to think it will ſucceed in all Mortifications. All theſe three Gentlemen gave half a *Drachm* for a Doſe every fourth Hour. Mr. *Shipton* increaſed the Doſe to two *Scruples*, and gave it while the Fever continued. He propoſes to have it tried in *Nomæ*, *Phagedænæ*, *Herpes*, or other chironian Ulcers. See Mr. *Ruſhworth*'s Letter; Mr. *Douglas*'s Account of Mortifications; and *Philoſoph. Tranſact. numb.* 426. § 5.

Jo. Ge. Henr. Kramerus aſſures us we may depend on the ſame Effect, in the Cure of

of a Dyſentery, from the Decoction of common *Millet* Seed, called *St. Ambroſe's Syrup*, as is promiſed on the *Simarouba* by Mr. *Juſſieu Commerc. literar. Norimberg* 1733, *Hebd.* vi. § 3.

Dr. *Dovar*, in his Phyſician's Legacy to his Country, having recommended Quick-ſilver as a moſt beneficial Medicine for ſeveral Diſeaſes, Morning Draughts of crude Quick-ſilver became the Top of the Mode laſt Winter in *London*; which has occaſioned the writing of a great many Pamphlets, ſome condemning, others extolling this Practice: But till the contending Parties are better agreed about their Facts, Caſes and Hiſtories, nothing poſitive can be determined. *vid. Vol. 3. p. 388.*

Mr. *Boulduc* deſcribes a Manner of making *Corroſive ſublimate* more eaſily and ſafely, than can be done in the common Way. He pours equal Quantities of *Quick-ſilver* and *dephlegmated Oil of Vitriol* into a Retort; then, with the Help of Fire, diſſolves the *Mercury*, and draws off the Phlegm, and Part of the Acid that does not incorporate with the Quick-ſilver: The Fire is continued till the white Maſs of diſſolved *Mercury* is dry, when he ſpeedily mixes it with equal Parts of the whiteſt common Sea Salt, dried by a gentle Heat,

and not decrepitated. And putting all into a *Matras*, makes the Sublimation in the common Way. After it is all raiſed, he breaks his *Matras*, by taking it out of the Sand-heat while it is warm, or by putting a wet Cloth on it; which prevents any of the *Sublimate* from falling down, as it does when the Glaſs is broke by ſtriking on it. *Memoires de l'Acad. des Sciences*, 1730.

Mr. *Le Fevre* propoſes a compendious eaſy Way of making *Colcothar of Vitriol*. He mixes two Parts of Filings of Iron with one of common Sulphur and a little Water; after the Acid of the Sulphur has diſſolved the Iron, he expoſes the Paſte to the Air, and it changes into *Colcothar*. *Hiſt. de l'Acad. des Sciences*, 1730.

Mr. *Petit* the Phyſician's Obſervations and Experiments on the Colour, Conſiſtence, Meaſure, Weight, *&c.* of the cryſtalline Humour of the Eye and its *Capſula*, in different Animals, are ſo minute and numerous, that it is impoſſible for us to make ſuch an Abridgment of them as our Deſign will allow; we ſhall only obſerve, that he ſhews the Cryſtalline to conſiſt of concentrical *Laminæ*: He always found the *Capſula* tranſparent, and denies any Connexion between this Membrane and the Cryſtalline, or that there are any Veſ-

ſels

ſels going from the one to the other; but that the Cryſtalline is nouriſhed by abſorbing the Lymph that is lodged between it and its *Capſula*. *Memoires de l'Acad. des Sciences*, 1730.

Mr. *Winſlow*'s Remarks on the Motions of the Head, Neck and Spine, and Mr. *Hunauld*'s Obſervations on the Bones of the human Scull, are ſo particular, that we muſt refer our Readers wholly to the Originals in the *Memoires de l'Acad.* 1730.

Dr. *Waltherus* Profeſſor at *Leipſick* has given a very minute Deſcription of the Muſcles and Ligaments in the Sole of the Foot, which we cannot abridge; and therefore muſt refer to the *Nov. Act. Erudit. Lipſ. April*, 1732.

Dr. *Alexander Steuart* Phyſician to the Queen of *England*, having cut off the Head of a Frog, obſerved, that upon thruſting a blunt Probe into the *Medulla ſpinalis*, the Muſcles of the Body were brought into convulſive Contractions; and that the ſame happened to the Muſcles of the Head, when the Probe was thruſt into the Brain. From which he concludes, the Brain and Nerves to contribute to muſcular Motion, and that to a very high Degree. Next, he laid bare the crural Artery, Vein and Nerve of a Dog; and placing a Thread parallel to

them, he made two Ligatures on them, at four Inches diſtance from each other; then cutting the Veſſels through beyond the Ligatures, he took them out, and obſerved that the Nerve did not contract, though the Blood-veſſels loſt three eighth Parts of their Length: From whence he infers, that what the Nerves contribute in muſcular Motion, cannot ariſe from, or be owing to Elaſticity, but to the Fluid they contain; which he thinks the Name of Spirits unhappily contrived to expreſs, becauſe it is apt to miſlead into an Idea of fermented or ſaline Spirits; whereas, ſays he, we have no Reaſon, from any Appearances we can obſerve, either in the Brain or Nerves, to judge theſe Spirits to be any other than a pure and perfectly defecated elementary Water. *Philoſoph. Tranſact. Numb.* 424. § 5.

An anonymous Phyſician, after mentioning the Arguments uſed for and againſt the Nerves being compoſed of cylindrical Canals containing a Fluid, offers what he calls an *Experimentum crucis* in Proof of ſuch a Structure; it is the Demonſtration of the optique Nerve inflated and dried, which appears cannular to the naked Eye. *Preſent State of the Republick of Letters, Vol.* XII. *Art.* 16.

Mr.

Mr. *Browne Langriſh*, in his Eſſay on muſcular Motion, endeavours, (*p.* 14.) to prove the Blood to have no immediate Effect in muſcular Motion; which he does, by Experiments of tying the crural and carotid Arteries of Dogs, who did not thereby loſe the Action of any Muſcles. He grants however, (*p.* 16.) that when all the Blood is intercepted, muſcular Motion ceaſes in a few Minutes. The chief Uſe of the Blood towards muſcular Motion is, in his Opinion, (*p.* 19.) to keep the Fibres warm, ſupple, diſtended, and every way ready for the Influx of animal Spirits into them; and by its expanſive and progreſſive Motion, to aſſiſt the Motion of the animal Spirits.

p. 23. He thinks the muſcular Fibres to be little hollow Cylinders, and could never obſerve that they were divided into Cells, Veſicles or Bladders.

After explaining at large his Opinion concerning the Doctrine of Attraction and Repulſion, and obſerving the Elaſticity with which our muſcular Fibres are endowed, and how volatile, ſpirituous Things, Aſtringents, and cold Bodies incite the Muſcles to a contractile Motion, and increaſe their Contraction; he ſuppoſes (*p.* 55.) the *animal Spirits* to be near a-kin,

or analogous to *Spirits of Sal Ammoniac*, Hartshorn, or human Sculls; and therefore, whenever they fly from the Nerves into the muſcular Fibres, they will increaſe the attractive Quality of their component Particles towards each other, ſo as to make them run nearer together, which will conſequently occaſion the Coats of the Fibres to be both thicker and ſhorter, and the Muſcle will be contracted, having all its Dimenſions rather diminiſhed than increaſed. (*p.* 78.) The *animal Spirits*, ſays he, are ſo ſubtile, that they cannot be fixed, and conſequently they will immediately make their Eſcape through the muſcular Fibres, and leave them in the ſame State they found them in, as ſoon as the Supply by the Nerves is by any means diſcontinued.

According to our Author, (*p.* 78.) there is a Difference in the Mechaniſm of the Nerves, which are ſent to the Muſcles that act by the Influence of the Mind, from thoſe of the Muſcles that are ſaid to perform involuntary Motions, the latter having no Let or Hindrance to the Courſe of the animal Spirits, unleſs ſometimes the Parts through which they paſs have Influence on them; whereas the Nerves which ſerve the Muſcles of voluntary Motion have

ſome

ſome little Conſtrictions at their Extremities, or elſewhere, which hinders the Courſe of their Fluids, except when their Reſiſtence is overcome by the *Momentum* of the animal Spirits being increaſed by the Will.

He thinks (*p.* 70.) the Uſe of the *Ganglions* is to prevent any Communication of Motion from one Nerve to another, whereby in a State of Health, Senſation is always performed diſtinctly.

Mr. *Mery* (*a*) attempted to eſtabliſh the Doctrine of Air being mixed with the Blood in the pulmonary Vein; and being again diſcharged into the Branches of the *Trachea*, by the ſmall Branches of the pulmonary Artery. His principal Argument in ſupport of this Doctrine was, That *Air* blown into the *Trachea* paſſed by the pulmonary Veins into the Heart, and that by blowing Air into the pulmonary Artery, it could be forced into the *Trachea*. Mr. *Bulfinger* at *Petersburg* undertook the Examination of theſe Facts, by a Variety of Experiments made with the Air-pump, by which he obſerved, that Water thrown in at the *Trachea*, ran out at both the pul-

(*a*) Memoires de l'Acad. des ſciences pour l'anée 1700 & 1707.

monary Artery and Vein, and chiefly by the Vein, which neither Milk nor Air would do. Water injected into the pulmonary Artery, paſſed into the *Trachea* and pulmonary Vein, which Air alſo did. Water injected into the pulmonary Vein was puſhed with Difficulty, but at laſt ran into the *Trachea*, and not into the pulmonary Artery. Finding therefore that he could not force Air in any Trial from the *Trachea* into the pulmonary Blood-veſſels, he concludes Mr. *Mery*'s Experiment, and conſequently his Syſtem, to be falſe; but makes an Apology for him, by ſhewing how readily his ſeeing the Air, which had been lodged in the Blood-veſſels before the blowing into the *Trachea*, or what enters in the Time of it, at the cut Veſſels, might have led him into the Miſtake, as it had done at firſt to ſome Gentlemen who ſaw Mr. *Bulfinger*'s Experiments, till he undeceived them. *Comment. Acad. Scient. Imperial. Petropol. Tom.* III. *p.* 230.

Mr. *Hales*, in his firſt Volume of Statical Eſſays, had given us by the Way ſome Experiments relative to the Force wherewith the Blood is propelled from the Heart into the Arteries; and now in his ſecond Volume or *Hæmaſtaticks*, he has treated this Matter more fully, giving us all the remarkable Circumſtances of the many hydrau-

draulico-ſtatical Experiments he has made with great Pains.

P. 31. He obſerves, " That the Force " of the Blood in the Veins and Arteries " is very different not only in Animals of " different Species, but alſo in Animals of " the ſame Kind; and even in the ſame A- " nimal according to its different Circum- " ſtances: From whence he concludes it " requiſite to be furniſhed with a good " Quantity of Obſervations, thereby to " find out the more nearly a Medium of " thoſe Forces, not only in the ſame Ani- " mal, but alſo in thoſe of different Ages, " Sizes and Kinds, whence happily ſome " curious Obſervations may ariſe." And indeed he has furniſhed us with a great many very curious Experiments, which may be of conſiderable Uſe in carrying on to the deſired Perfection an hydraulical View of the animal Body.

In the mean Time he concludes from his own Obſervations, That the Quantities of Blood paſſing through the Hearts of different Animals in a given Time, and the Forces of the Blood in the Veſſels are not proportioned in any regular Way to their Sizes, *p.* 44.

To give a Detail of all his Experiments, would be to tranſcribe a great Part of the Book,

Book. We ſhall only give the Subſtance of a few of the cardinal Obſervations that are of the greateſt Conſequence, and moſt out of the ordinary Road.

The Force which the left Ventricle of the Heart ſuffers, or wherewith it ſqueezes the Blood in the Beginning of its Contraction is 113 *lib.* in a Mare, whoſe arterial Blood roſe to 114 Inches perpendicular Height in a Glaſs Tube, fixed into the Carotid Artery, *p.* 21. In a Dog whoſe Blood roſe 80 Inches high, he determined the Force of the Ventricle to be 33 *lib.* and a half *p.* 38. And he thinks that in a Man of a middle Conſtitution, the Blood would riſe 90 Inches, and the compreſſive Force of the Heart to be 51 *lib.* and a half, *p.* 40.

P. 48. *&c.* He gives an experimental Proof of the great Reſiſtance the Blood meets with in paſſing through the ſmal Arteries. " And to this Reſiſtance is owing " the great Difference of the Force of the " Blood in the Arteries to that in the " Veins, *viz.* as 10 or 12 to 1." *p.* 55.

Becauſe equal Quantities of Blood paſs through the Lungs, and all the reſt of the Body in the ſame Time, it is commonly reckoned that the Blood has a much greater Celerity in that *Viſcus*, than in its ordinary Courſe through the Body. To con-

firm

firm and illuſtrate this, Mr. *Hales* obſerves, That the Parts of the Body through which there is a free Circulation, are about thirty Times heavier than the Lungs, *p.* 64; and that a Quantity of Blood equal to twenty eight Times the Capacity of the pulmonary Veſſels paſſes through them in a Minute, *p.* 66. To ſtrengthen which Calcules, he finds by microſcopical Obſervations (*if the Computation were juſt*) the Celerity of the Blood in the ſmall Arteries of the Lungs of a Frog, is forty three times greater than in equal Arteries of the Muſcles, *p.* 68, 69.

Mr. *Hales* having obſerved the Lungs to be much dilated, by pouring in Blood into the pulmonary Artery of Lungs taken out of the Body, *p.* 75. and ſeeing the Lungs diſtended in a living Dog, after a large Inciſion had been made into the Cavity of the *Thorax*, concludes the natural Dilatation of the Lungs in living Animals, to be owing partly to the Blood forcibly propelled into them by the pulmonary Arteries, *p.* 77.

P. 323. From the Diminution of the Elaſticity of the Air by the Breath of Animals, he takes Occaſion to ſhew the miſchievous Conſequences of crowding many People together, as in Jayls, &c. and obſerves

ſerves of what great Benefit it would be to contrive thoſe Places in ſuch a Manner as that they might have a conſtant Eventilation, or new Recruits of freſh Air. A Precaution which *Ramazzini* very judiciouſly recommended to be uſed in the Dormitories of Convents.

Mr. *Hales* in his firſt Volume had reckoned the Quantity of Moiſture expired by the Lungs in a natural Day to be about ſix Ounces and a half, almoſt the ſame *Sanctorius* reckoned from the Drops collected upon a Glaſs. But Dr. *Liſter* thought that too ſmall an Allowance by much. Now Mr. *Hales*, by making his Breath paſs through dry Aſhes, found the expired Moiſture to be at the Rate of 9792 Grains, or $\frac{9792}{4 \cdot 3 \cdot 8} = 22\frac{1}{3}$ Ounces, or 1,39 *lib. Averdup.* which falls in pretty nearly with Dr. *Thruſton*'s Conjecture, when he ſuppoſed the Quantity expired by the Lungs, to be equal to the Perſpiration from all the reſt of the Body.

Becauſe in the common Method of injecting the Animal Veſſels with a Syringe, one cannot be aſſured with what Force the injected Liquors are impelled; our Author thought of a Way of doing it, as it were, hydroſtatically, by the Weight of the ſuperincumbent Column of the injected Liquor,

quor, which ſhould be conſtantly uniform, and nearly equal to the Force of the arterial Blood, *p.* 145. And on this Occaſion, *p.* 148, he makes publick Mr. *Ranby*'s injecting Matter, which conſiſts of *white Roſin* and *Tallow*, of each two Parts, eight Parts of *Turpentine Varniſh*, and three Parts of the tinging Powder, as *Vermilion* or *Indigo*, all duly mixed and prepared.

From his Injections and microſcopical Obſervations, he alledges, that the very minute extreme Arteries ariſe all at right Angles from their reſpective Trunks, and do not form any Net-work or Inoſculations with each other (as he allows the larger Capillaries to do) and that they are moſtly inſerted at right Angles into large venous Trunks. *See p.* 51. 67. 70. 150, 151.

From a careful Obſervation of the Appearance of common Fleſh, Dr. *Lower* reckoned the Contraction of a Muſcle to be owing to the Criſpation of its Fibres. This ſeems to receive ſome Confirmation from a very curious microſcopical Obſervation of Mr. *Hales*'s, upon the Action of the Muſcles in a live Frog, whoſe parallel Fibres he obſerved in Contraction to be changed into *rhomboidal Pinnulæ*, *p.* 61.

This Author did not confine himſelf to the

the Conſideration of the Forces of the Fluids; he likewiſe gives us ſome new and curious Experiments of the Strengths of the Arteries, Veins, *Perioſteum* and Ligaments, *p.* 155.——172.

He eſtimates the Preſſure of the Stomach on the Aliments to be about 20 *lib.* inſtead of the immenſe and incredible Forces ſome had aſcribed to it, *p.* 179.

Upon transfuſing warm Water into a Dog, when the Blood came to be very diluted he died, *p.* 114. and had an univerſal Dropſy from the ouzing of the watery Parts of the too thin diluted Blood through the ſmall Orifices that are not large enough to admit the red Particles, *p.* 116. *Lower* had formerly found the ſame Effect from making Ligatures upon the Veins.

As Dr. *Keil* had obſerved how ſome People are ſubject to Headaches and Flushings of the Face after Dinner, from the Diſtenſion of the Stomach; in like manner Mr. *Hales* remarks, that the flatulent are often ſubject to a ſhort ſwimming or *Vertigo*, from the Wind diſtending the Gullet, and ſo preſſing on the deſcending *Aortâ*, whereby the Blood is too forcibly driven to the ſuperior Parts, *p.* 183.

Although the Operation of ſeveral Medicines may be pretty well underſtood, yet

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ſince it is making ſome Advance in Knowledge further to illuſtrate even known Truths; our Author, by injecting various Liquors, ſhewed their great Powers of relaxing or ſtraitning the Veſſels. Heat and warm Water were found to relax them. The Aſtringents he tried were cold Water, Spirit of Wine, Decoctions of *Peruvian Bark*, of Oak-bark, of *Chamæmel* Flowers, of *Cinamon* and *Piermont* Water, *p.* 127, —135.

Mr. *Hales* in his firſt Volume had obſerved that an urinous *Calculus* was the Body in the World wherein he found the greateſt Quantity of Air wrought into its Compoſition, and thence conceived great Hopes of finding out ſome *Menſtruum* which might rouze this active Principle, and ſo diſſolve that moſt formidable Concretion, which has hitherto bafled all human Art and Contrivance. Many but fruitleſs were his Trials; however at length he found a *Menſtruum*, and that not very acrid neither; which, tho' it could not well be reduced to Practice, has a great Power this Way, eſpecially on the ſofter *Calculi*, from which we are encouraged to hope for greater Light and Advantage in this Matter. It is a Solution in Water of the ſtrongeſt *Alcali*, and the ſtrongeſt Acid juſt in the Act

of

of Efferveſcence, to wit, *Salt of Tartar* and *Oil of Vitriol*, or of *Sulphur*, *p.* 203, *&c.*

That the Effect of any *Menſtruum* injected into the Bladder for diſſolving the *Calculus* may not be prevented, by the Mixture of too much Urine, he propoſes to make a continual Flow of Liquors into and out of the Bladder during the Injection, by uſing a *Catheter*, the Cavity of which is divided length Ways, by a thin Partition, into two ſeparate Channels, which end in two divaricating Branches. By one of theſe Branches he injects the *Menſtruum* into the Bladder, in the common or rather in the hyſtroſtatical Way, while it returns mixed with Urine by the other Branch, *p.* 212.

Onions have a greater diſſolving Power of the Gravel than ſome other hot alcaleſcent Plants, as *Scurvy-graſs* or *Horſe Radiſh*, *p.* 215.

The Gravel more readily attacks thoſe of a hot Conſtitution and Men, than People of a lax Conſtitution and Women, becauſe in the former the Urine is more highly alcaliſed, attenuated and digeſted, *p.* 217, 218. The more attenuated and digeſted Aliments are moſt liable to breed calculous Concretions, contrary to the Doctrine of the

the Ancients, *p.* 221, 222. Probably Stones increaſe moſt in the hot Seaſons, otherwiſe than what *Aretæus* (*de Chron. &c.* II. 3.) reckoned, *p.* 225.

For better preventing the Gravel, Mr. *Hales* propoſes lying as Soldiers do in their Barracks, not in a horizontal, but a reclined Poſture, with the Head and upper Parts of the Body conſiderably higher than the Feet and lower Parts; whereby the Urine is not detained ſo long in the Kidneys, as to allow its tartarous Parts to attract each other, *p.* 229.

Our Author gives us a new and very ingenious Contrivance of a *Forceps*, for extracting a Stone ſticking in the *Urethra*, which Mr. *Ranby* and other Surgeons have uſed with very good Succeſs. He made it thus: " He cut off the lower End of a " ſtrait *Catheter*, which made it a proper " *Canula* for a *Stillet* or *Forceps* to paſs " through; the lower End of the *Forceps* " was divided into two Springs like Twee- " zers, whoſe Ends were turned a little " inward: Theſe Springs were made of " ſuch a Degree of Tenderneſs and Plian- " cy, as not to bear too hard againſt the " Sides of the *Urethra* by their Dilata- " tion.

" When this Inſtrument is uſed, the

" Springs are drawn up within the *Canu-*
" *la*; which being passed into the *Urethra*
" as far as to the Stone, the *Canula* must
" then be drawn back so far as to give
" Room for the *Forceps* to dilate; which
" dilated *Forceps* being then thrust down
" a little further, so as to embrace the
" Stone, then the *Canula* must be again
" slid down, to make the *Forceps* take
" fast hold of the Stone, so as to draw
" it out.

Dr. *J. Ad. Kulm* Professor of Anatomy at *Dantzick*, observing the Difficulties which attend the Distension of the Bladder with a Liquor, in performing the high Operation for the Stone, especially in Women, has contrived an *elevatory Catheter* of the Bladder for that Sex. The Bending of it is fitted to the Turn of the *Os Pubis*, and its great Curve, instead of being only furrowed on the convex Side, is pierced quite through. He introduces this *Catheter* into the Bladder, with its Convexity to one Side; then gently raises it to the *Hypogastrium*, and cuts securely upon it. *Nova Act. Erudit. Lipsi. Mart.* 1732.

Saltzmannus relates an Instance of a Luxation of the Thigh-bone, without any Fracture of its Neck, and confirms what *Ruysch* had observed of the *Epiphyse* of the

the *Os Femoris* being as it were annihilated, or at leaſt being changed, ſo as it could not be obſerved when ſought after in one who had it broken. *Comment. Acad. Petropolit. Tom.* III. *p.* 275.

Oliver St. John Eſquire gives the Deſign in Perſpective of the *Arcuccio*, an Inſtrument to prevent the overlaying of Children, which the Nurſes in *Florence* are obliged to lay the Children in under Pain of Excommunication. It conſiſts of a ſemicircular Piece of Wood, or *Head-board*, of one Foot and an Inch Diameter, to each Side of which a Board three Foot two Inches and a half long is faſtned. Each of theſe has a Hollow on the upper Edge, near to the *Head-board*, for the Nurſe's Breaſt to reſt in when ſhe gives Suck, and a ſemicircular Arch of Iron is fixed to them near the other End. From the Top of the *Head-board* to the Middle of the Iron Arch there is a Bar of Wood fixed, on which the Nurſe leans when ſhe ſuckles the Child. The *Arcutio* with the Child in it may be ſafely laid intirely under the Bed-cloaths in the Winter, without Danger of ſmothering. *Philoſ. Tranſact. Numb.* 422. § 6.

Dr. *Wintringham*'s *Commentarium noſologicum*, being principally a concile Narration of Facts, will not allow of an A-

bridgment; but we cannot but refer our Readers to the Book itſelf, where they may ſee an induſtrious accurate Compariſon of the Changes of the Air with epidemick Diſeaſes, accompanied with a very ingenious *Ætiology* modeſtly propoſed. Among the many judicious Reflexions this Author makes on the Cure of Diſeaſes, according to their different Circumſtances, we ſhall only mention two that relate to the preſent raging epidemick Diſeaſe of this Place, the *Small-pox*.

P. 63. He never obſerved antiphlogiſtick Medicines that open the Belly, diluent Clyſters, or ſuch like, to have any bad Effect in this Diſeaſe, by weakning the Patient, or making the Swellings of the Face and Extremities fall; but on the contrary, has always ſeen them very ſerviceable to young vigorous plethoric Patients, while too bound a Belly frequently produces at laſt a very dangerous *Diarrhœa*.

Queſt. 23. He propoſes in urgent Caſes of the confluent Small-pox, where the Reſorption of the variolous Matter is in great Danger of increaſing the ſecondary Fever, that the Puſtules ſhould all be opened and treated as ſo many Ulcers by a Surgeon.

Dr. *Hilſcher* Profeſſor of Medicine at *Jena*, in a ſmall Eſſay, intituled, *Proluſio*

ſio de amputatione & raſura capillorum in variolis, recommends the cutting off the Hair in the Small-pox, by which Perſpiration may be increaſed. This Method was practiſed on the King of *Spain*'s Son *Don Carlos*, and on a *Saxon* Prince, with Succeſs.

The Urine of phthiſical People is ſaid to be always ſpecifically heavier than that of People in Health, or in any other Diſeaſe, *Commerc. Norimberg.* 1732, *Hebd.* 44.

The ſame anonymous Author who deſcribed the Colick that prevailed in *Amſterdam* in 1730, has continued his Diſſertation on theſe Colicks, to ſhew the other Cauſes, beſides the Gout, on which they may depend; and, conſequently, how differently they ought to be treated. *Bibliotheque raiſonnée des Ouvrage des Scavans de l'Europe, Tom.* IX. 1. & 2. *Parties.* In his laſt Paper he mentions ſome curious enough Obſervations he made on ſucking Rabbits, that were taken with Vomiting, Purging and Convulſions, in the Stomach of which he found the Milk ſtrongly curdled, and moſt abominably fetid.

Dr. *William Cockburn*, Phyſician at *London*, diſtinguiſhes *Fluxes* into thoſe from a *Stimulus*, and thoſe from a greater than ordinary Secretion of a watery Subſtance

from the Blood into the Guts. The former is to be treated according to the different *Stimuli*. When it proceeds from indigeſted Food, Fruits or ſuch like, the common Methods will be ſucceſsful enough, or it will cure of itſelf. When Bile is the Cauſe, it is more difficult. If the Piles, an Ulcer or Stricture of the Guts, act as *Stimuli*, the Way of treating the Flux muſt be very different. And, in the watery Flux, all the common Methods, of Purging, Vomiting and Aſtringents, are hurtful, *Philoſ. Tranſact. Numb.* 425. § 3.

Dr. *Dovar*, in his Book called, *The ancient Phyſician's Legacy to his Country*, propoſes Cures for Diſeaſes that frequently are different from the ordinary Practice. We ſhall ſet down ſuch of them as ſeem to be moſt uncommon.

According to him, a gouty Patient will be free of Pain two or three Hours at fartheſt after taking a Doſe, which is from forty to ſeventy Grains of the following Powder. Take *Salt-petre*, and *Tartar vitriolated*, each four Ounces; put them into a red-hot Mortar; ſtir them with a Spoon till they have done flaming; then powder them very fine; and after that ſlice in an Ounce of *Opium*: Grind theſe to a Powder; and afterwards mix with it an

Ounce

Ounce of the Powder of *Ipecacuanna*, and as much of the Powder of *Liquoriſh*. This Powder is to be taken going to Bed, in a Glaſs of White Wine Poſſet-drink, covering up warm, and drinking a Quart or three Pints of Poſſet-drink while ſweating.

Mynſicht's Elixir of Vitriol often taken, though it may cauſe Pain for ſome Time, yet moſt certainly deſtroys the gouty Matter, and muſt in the End have its deſired Effect.

One who writes Notes to the Legacy, ſuſpects the Doctor's Cure for a Dropſy, which he had not told, to be *Ol. Juniper.* or elſe an Infuſion of Juniper Berries roaſted, and made into a Liquor like Coffee.

His Cure for an *Anaſarca* is an Electuary compoſed of *Steel*, prepared with *Sulphur* and *crude Antimony*, each an Ounce, *Diagridium* four Ounces; make a fine Powder of theſe; then add as much of any Syrup as will make a ſoft Electuary. The Doſe, a large Spoonful at Night, going to Bed, and another in the Morning. Liquors muſt not be taken with this Purge.

Allom Poſſet-drink is an effectual Cure for a *Diabetes*.

A *Phthiſis pulmonalis* or Conſumption of the Lungs, is principally to be cured by frequent Bleeding in ſmall Quantities. In

one Patient he determines the Quantity to have been ſix Ounces once a Day for a Fortnight.

The moſt beneficial Thing in all the World for the Lungs, is, in our Author's Opinion, to take an Ounce of *Quick-ſilver* every Morning. This is his darling Medicine, which he alſo recommends in the Stone or *Nephritis*, Barrenneſs, *Chloroſis*, Diſeaſes of the Stomach and Inteſtines, *&c.*

Green Fruit deſtroys Worms, ripe Fruit breeds them.

He recommends large Doſes of *Mercurius dulcis* with *Cinnabar* of *Antimony* in the nervous or Head Diſeaſes, *Palſy*, *Hemiplegie*, *Epilepſy*, *Apoplexy*.

He cured the *Plague* that had got among the Sailors in a Voyage to the *South-Sea*, by one very plentiful Blooding, he ſays, to the Quantity of a hundred Ounces, and with Drink ſharpned with *Spirit* and *Oil of Vitriol*.

In ſpotted Fevers he recommends large Bloodings, purging every other Day, with a Paregorick at Night, and cooling acidulated Medicines in the intervening Days.

He cured a young Man of ſuch a Fever, and a violent *Hæmorrhagy* at the Noſe, by putting him into cold Water.

In

In the confluent and anomalous Small-pox he recommends *Mercur. dulc.* and *Cinnab. Antimon.* on the ſeventh and thirteenth Days.

In an *Angina* or *Quinſy*, beſide high Bleeding, he recommends a *Gargariſm*, compoſed of *ſublimate Mercury* half a Drachm, *Cream of Tartar* two Drachms, diſſolved in a Pint of Spring Water.

Bleeding, he affirms, is no Remedy in the *Rheumatiſm*; though this Diſeaſe is, in his Opinion, a high inflammatory Fever.

Fevers on the Spirits are cured by the *Bark*, in the ſame Manner as the Ague is.

In Diſeaſes of the Stomach, our Author is againſt Vomiting; but thinks Purging more reaſonable.

XXXV. *A Liſt of Medical Books publiſhed ſince the Beginning of the Year* 1732.

Hiſtoria vitæ & meritorum Frederici Ruyſch, Auctore Joanne Frederico Schreibero M. D. 4*to*, Amſtelod. 1732.

Variolarum Antiquitates nunc primum è Græcis erutæ à Jo. Gothofredo Hahn *Phil.*

Phil. & Med. D. accedit de Meſuæ Syri *ſcriptis ad* Cel. Fabricium *Epiſtola*, *4to*, Brigæ 1733.

Bartholomæi Lavagnoli in Patav. Gymnaſio Med. Theor. Pr. *de uſu pravo & recto diſciplinarum optimarum in Medicina opus, in tres partes diviſum, pars 1ma, de uſu Chymiæ*, Pataviæ 1732.

The State of Phyſick ancient and modern briefly conſidered, with a Plan for the Improvement of it, by *Francis Clifton* M. D. *&c.* *8vo*, *London* 1732.

A brief and diſtinct Account of the Mineral Waters of *Piermont* tranſlated from *Seippius*'s Treatiſe; as alſo a like Account of the Waters of *Spa*, extracted from the beſt Authors, by *George Turner* M. D. *8vo*, *London* 1733.

A Treatiſe of Mineral Waters particularly of *Bath*, in *Somerſetſhire*, *&c.* by *J. Quinton* M. D. *8vo*, *London* 1733.

The natural, experimental and medicinal Hiſtory of the mineral Waters of *Yorkſhire*, *Derbyſhire*, and *Lincolnſhire*, by *Thomas Short* M. D. *4to*, *London* 1733.

Adolph. Gottlieb. Richteri Ph. & M. D. *de corruptelis medicamentorum cognoſcendis tractatus Medico-chymicus*, *8vo*, Dreſdæ & Lipſiæ 1732.

An Account of Mortifications, and of the

the ſurpriſing Effects of the Bark, in putting a Stop to their Progreſs, *&c.* by *John Douglas* Surgeon, F. R. S. 8*vo*, *London* 1732.

Jo. Helfrici Junkhen *Corpus Pharmaceutico-chymico-medicum. Editio tertia prioribus longe auctior reddita, per* Davidem de Spina M. D. *fol.* Francofurt. ad Mænum 1732.

Dr. *Boerhaave*'s Elements of Chemiſtry, faithfully abridged from the late genuine Edition publiſhed and ſigned by himſelf at *Leyden*. With all the Cuts and Explanations, as in the Original. To which are added curious and uſeful Notes, rectifying ſeveral Opinions, *&c.* of the learned Author. By a Phyſician, 8*vo*, *London* 1732.

Some Obſervations on the Tranſlation and Abridgment of Dr. *Boerhaave*'s Chemiſtry, wherein the learned Profeſſor is vindicated from the unjuſt Repreſentations and weak Criticiſms of his Abridger, in a Letter to *Cromwell Mortimer* M. D. R. S. Secr. by *John Rogers* M. D. 8*vo*, *London* 1733.

Tabulæ Anatomicæ, in quibus corporis humani omniumque ejus partium ſtructura & uſus breviſſime explicantur. Acceſſerunt majoris perſpicuitatis causâ annotationes

tationes & tabulæ æneæ, Auctore Jo. Adamo Kulmo Prof. Gedanenſi, 8*vo*, Amſtelod. 1732.

Joſephi Pozzi Prof. Bononienſis *Orationes duæ, quibus accedit epiſtolare Anatomicum commentariolum*, 4*to*, Bononiæ 1732.

Lettre de Mr. Petit Docteur en Medecine, &c. *contenant des Reflexions ſur des Decouvertes faites ſur les yeux*, 4*to*, à Paris 1732.

An Eſſay on muſcular Motion, founded on Experiment, Obſervation and the *Newtonian* Philoſophy, by *Browne Langriſh* Surgeon, 8*vo*, *London* 1733.

Statical Experiments containing Hæmaſtaticks, or an Account of ſome hydraulick and hydroſtatical Experiments made on the Blood and Blood-veſſels of Animals, *&c.* by *Stephen Hales* Rector of *Farringdon*, 8*vo*, *London* 1733.

Opere Fiſico Mediche Stampate è Manoſcritte del Cavalier Antonio Valiſneri, *raccolte da* Antonio *ſuo Figliuolo, corredate d'una Præfatione in genere ſopra tutte, di una in particulare ſopra il vocabulario della ſtoria naturale*, Tom. 1. *fol.* Venet. 1732.

An Eſſay on the Improvement of Midwifery, chiefly with Regard to the Operation,

tion, to which is added fifty Caſes, ſelected from upwards of twenty five Years Practice, by *Edmond Chapman* Surgeon, 8*vo*, *London* 1733.

Henrici à Deventer M. D. *Ars obſtetricandi, Editio 2da, cui novæ obſervationes acceſſerunt*, 4*to*, Lugd. Bat. 1733.

Colloquia Chirurgica; the fourth Edition, by *James Handley*, 8*vo*, *London* 1733.

Traité complet de Chirurgie, par Guillaume Mauqueſt de la Motte *Chirurgien, ſecond Edition revuë, corrigée & augmentée*, en 4 Tomes 12*mo*, Paris 1732.

Rari casûs explicatio Anatomico-medica, Autore Thoma Schwenke M. D. Anat. Pr. 8*vo*, Hagæ 1733.

Morbi epidemici brevis deſcriptio & curatio per Diaphoreſim, Autore Joanne de Gorter M. D. & P. 4*to*, Harderwic. 1733.

Commentarium noſologicum morbos epidemicos & aëris variationes in urbe Eboracenſi lociſque vicinis per ſedecim annos graſſantes complectens, Autore Cliftono Wintringham M. D. 8*vo*, Londini 1733.

An Eſſay concerning the Effects of Air on human Bodies, by *John Arbuthnot* M.D. 8*vo*, *London* 1733.

Joan-

Joannis Freind M. D. *opera omnia medica, fol.* Lond. 1733.

La medecine theologique ou la medicine crée telle qu'elle ſe fait voir ici ſortie des mains de Dieu Createur de la nature & regie par ſes loix. On y a joint à la fin les Theſes de medicine de l'Autheur de ce traité, Mr. Hecquet, 2 *Vol.* 12*mo*, à Paris 1733.

A Diſcourſe on the Nature and Cauſe of ſudden Deaths, 8*vo*, *London* 1733.

Obſervationes Medicæ, à G. Clinch M. D. 8*vo*, London 1733.

M. Ludovici Joannis le Thieullier *in* Univerſitate Pariſienſi Regentis *Obſervationes Medico-practicæ*, 12*mo*, Paris 1732.

The ancient Phyſician's Legacy to his Country, being what he has collected himſelf in forty nine Years Practice, by *Thomas Dovar* M. D. 8*vo*, *London* 1732.

Several Pamphlets for and againſt the preceding Book.

The *Engliſh* Malady, or a Treatiſe of nervous Diſorders of all Kinds, by *George Cheyne* M. D. 8*vo*, *London* 1733.

Le Brigandage de la medicine dans la maniere de traiter les petites Veroles, & les plus grandes maladies par l'Emetique, la Saignée du Pied & le Kermes mineral. Avec un traité de la meilleure maniere de

de guerir les petites Veroles par des remedes & des observations tirées de l'usage, 12*mo*, à Utrecht 1732.

Observations de medicine sur la maladie appellée convulsion, par un Medicin de la Facultée de Paris, 12*mo*, à Paris 1732.

A Letter to Sir *Hans Sloane* about the Cure of the Gout, by Dr. *Stuckley*, 8*vo*, *London* 1733.

Geo. Dan. Goslwitzius M. D. *de gravidarum & puerperarum, nec non de infantum recens natorum regimine & affectibus*, 4*to*, Lipsiæ & Suidnicii 1732.

Jo. Phil. Burggravii jun. *Lexicon-medicum universale, Tom.* 1. *continens A. B. fol.* Francofurti ad Mænum 1733.

Philosophical Transactions for the Year 1732, 4*to*, *London*.

L'Histoire & les Memoires de l'Acad. des Sciences, Année 1730, 4*to*, à Paris 1733, & 12*mo*, à Amsterd.

Commercium literarium Norimbergense, Anni 1732. Semestr. 2. —— Anni 1733. Semest. 1. 4*to*, Norimberg.

Commentarii Academiæ Scientiarum Imperialis Petropolitanæ, Tom. III. *ad Annum* 1728, 4*to*, Petropoli 1732.

XXXVI.

XXXVI. *BOOKS proposed, and other medical News.*

JOsias *Weitbreicht* Professor of Physiology at *Petersburg* is preparing a *Desmologia*, or a Description and Delineations of all the Ligaments of the human Body.

Dr. *Trew* Professor of Anatomy at *Norimberg*, is engaged in an Examination of the Ligaments of the Bones.

Dr. *Vercelloni* Physician at *Asti*, is soon to publish a Treatise under the following Title, *Psycologia, seu motuum animalium & recipricorum machinæ animalis Theoria medica, omnes humanos actus autopticâ & facili quamvis hactenus inauditâ methodo explanans.*

The chirurgical Academy at *Paris*, mentioned in our first Volume, *p.* 361, will soon publish a Volume of Memoirs.

Dr. *John Arbuthnot* in the Preface to his Essay concerning the Effects of Air on human Bodies, promises to complete his Account of the Non-naturals, by a Treatise on Rest and Motion.

Dr.

Dr. *Albrecht* Profeſſor of Medicine at *Erford*, is preparing a Treatiſe, *de effectibus muſices in corpus animatum in extenſo.*

Dr. *Keſtner* is compoſing a *Lexicon literarium medicum.*

The Chirurgical Academy at *Paris* has propoſed the following Problem this Year, What is the Advantage or Diſadvantage of different Kinds of Tents uſed in enlarging Wounds, according to the different Circumſtances of the Diſeaſe and Patient?

The Society of St. *Hubert* at *Lisbon* in *Portugal*, were to give their laſt Year's Prize to him who accounted beſt for the Cauſe and Nature of the Plague.

Dr. *Gohl* who publiſhed the *Acta Medicorum Berolinenſium*, died in the 1732, but it is expected that Dr. *Chudenius* will continue that Work.

Daniel Fiſcher Phyſician at *Keſmark*, has undertaken to collect and publiſh the Obſervations of the *Hungarian* Phyſicians mentioned in our former Volume, and has diſperſed an Invitation to engage them to communicate Papers to him.

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